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Publisher—Hugh Highsmith
Office Manager—V. M. Binkert

ADVISORY EDITORIAL STAFF

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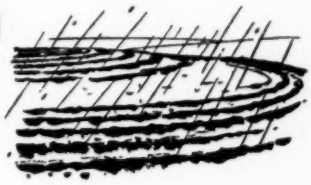
The Farmers Digest

Volume 18 March 1955 Number 9

LOOK WHAT HAPPENS WHEN IT RAINS



You may have wondered about what happens when rain reaches your crop fields and pastures. Until recently the experts didn't know. . .

Condensed from Soil Conservation

George W. Musgrave, Soil Conservation Service

MOST of us think we know what happens when it rains. But do we, actually?

We know that rain wets the ground and the vegetation. We know that some rain goes into the ground. The amount may be enough to grow a crop. At other times, most of the rain runs off. At intervals there may be enough penetration to replenish springs and wells that are nearly dry. At other times the same amount of rainfall fails to produce these effects. On some soils farmers are known to plow within an hour after a heavy rain and have no bad results.

If you ask how much of a given rain will go into a certain soil, you have a good chance to stump the experts. Or you may ask how much will stay in the root zone for as long as a full day. No one can give a precise answer with any assurance. Usually the answer must be based on other "ifs"—if it rains as

Reprinted from Soil Conservation, Washington, D. C., January 1955

much as 4 inches; if it is a slow rain; if the ground was already moist, for example.

Much of the science of farming, of the conservation of soil and of water, depends upon at least approximately correct answers to questions like these. In the last 25 years there has been a tremendous advance in our ability to find the answers.

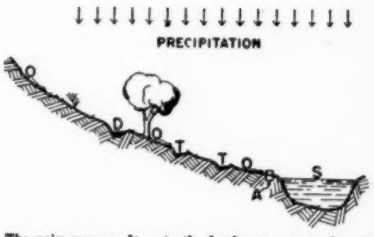
To show how great has been the change in thinking, let me confess some of my own ignorance as of 1929 or thereabouts. I was measuring rainfall and runoff. The question arose: What happened to the water that did not run off? Discussion with many state and federal workers did not provide an answer. Therefore, a small experiment was set up to try to see what could be found out. If we applied manure to some of the test areas, how would it affect the amount of rainfall entering the soil; the amount of water held by the soil; the amount and rate of movement of water through the soil? Many of the people with whom we talked (including co-workers, farmers, a county agent) thought manure would slow down intake of rain and movement through soil. This wrong idea, of course, came from our lack of information. Today we know that the opposite is true but our first published report dealt with cultivation and its effect on intake.

In those early days of studying what happens to rainfall, other people, too, had mistaken ideas. A very famous engineer considered that the amount of water entering the soil in the first 15 minutes was the same in amount as that entering it during any other 15-minute period. Though we now know that the rate of intake at the beginning is higher than that of later periods, such information was not available 25 years ago.

The amount of rainfall on a forest or cornfield is greater than that reaching the ground beneath such a canopy. A snowstorm on a pine forest makes a fairyland of beauty because part of the snow never gets to the ground. Rain, also may be held on vegetation, the amount depending upon the density of the vegetation and the kind of storm. This amount may vary from 0.01 inch to 0.30 inch or more. But far greater in importance than the difference in amount reaching the ground is the protection the vegetation provides the soil against the pounding of the drops. A sharp shower on bare ground really tears the soil apart but the same rain on a good meadow may do little damage. This we all have observed many times.

One of the worst things that happens to the bare ground is that its surface is sealed over by muddy water, and later rains do

not readily enter the soil. But this does not happen in the good meadow nor the good forest. Nor does it happen when the wheatgrower has applied a straw mulch to his field, nor when subsurface tillage is practiced so that the remains of a preceding crop are left on the surface. Let's take an actual case. Measurements of the capacity of a soil typical of the Corn Belt have been made and the hourly changes in moisture movement when it rains carefully noted.



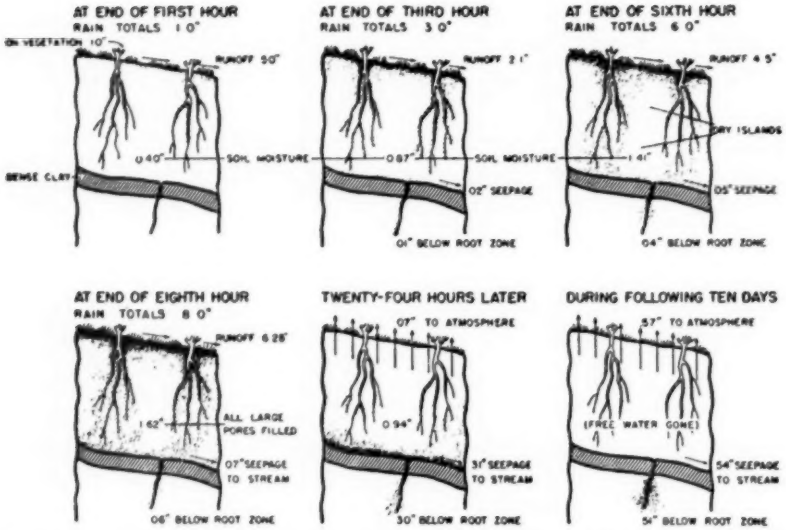
The rain comes. It wets the landscape, starts flow in diversion ditches (D), fills terrace channels (T), produces flow (O), and adds to streamflow (S). What happens within the block of surface soil (A) is described in this article.

The measured rates of intake of water by soil growing corn and by land in bluegrass pasture are compared.

The two fields start with a rate above 1 inch per hour, indicating that rain of 1 inch per hour would be entirely absorbed for a few minutes under either condition. After an hour, the intake rate on the corn has dropped to about half an inch per hour, but the pasture has dropped only to 0.8 inch per hour. After 5 hours the corn ground has dropped to 0.18 inch per hour but the pasture, at 0.29 inch per hour, is 60 percent above it! During the 5 hours the corn ground has had a total intake of 2.17 inches and the pasture 2.77 inches. This difference of 0.6 inch is not unusual and actually is often exceeded on deep soils. It is about the same as though the pasture received 0.6 inch more rain in one storm—something which, in a dry year, can make a person feel good!

There are, of course, other things that can also encourage the intake of water. On tight soils or soils with naturally low intake rates, improvement can result from such things as building up the organic matter content. This has the effect of forming larger pores in the soil. There are numbers of other ways, too, of retarding flow and giving more time for infiltration, such as contouring, using level terraces, and using close vegetation like grass and alfalfa, in contrast to row crops.

We know much more about rainfall and water **on** the land surface than we do about the movement of water **beneath** the surface. Especially, are we weak in information as to **how much** water moves up, down, or sideways within the soil, at what seasons of the year, and under what different conditions. The greatly oversimplified sketches



The intake of water by the soil (marked A in sketch) is only part of the story of what happens when it rains. During the first hour only the upper portion and that along old root channels are saturated. Gradually, with more rain and more intake, the soil becomes nearly saturated and seepage from Block A starts toward streams and deepseated ground water. Note that there still remain some dry islands after 8 hours of rain. After rain ceases, the soil begins to dry out from the top, and in about 10 days loses the water it had gained in this storm.

below may help in showing how movement of water in some one direction also affects movement in another—a matter of real importance to anyone concerned with management or use of water.

The accompanying sketch shows what happens on the ground surface—something we all see and know. But what happens within a block of soil near the surface, like the block labeled "A" in the sketch?

Suppose it rains an inch per hour at a time when the soil is moist. The intake of water and its movement through the soil is often like the case portrayed by the series of sketches that show what has happened at the end of 1 hour of rain; 3 hours; 6 hours; 8 hours.

This being a sandy loam with average vegetation on it, a few old root channels in it, and a normal or very common intake rate, we see at the end of 1 hour of rain that 0.10 inch of it is on the vegetation; 0.5 inch has run off the surface; and 0.4 inch has entered the soil, the newly added water being mostly near the surface and along the old root channels.

At the end of the third hour of rain, runoff has totaled 2.1 inch of the 3 inches of rainfall, and a total of 0.87 inch of water has been added to the soil. A lit-

tle of the 0.90 inch that entered the soil has seeped out toward the stream, moving along a clay layer just below the plant roots. A little has broken through the clay layer and started moving down toward ground water.

After 6 hours of rain, the larger pores of the soil have nearly all filled, although there are still a couple of dry "islands" not yet wetted. Seepage has continued and there has been, also, some further movement to depths below root zone.

During the seventh hour (not shown in the sketch) all but 0.03 inch of the large pore capacity of the soil is filled, so that in the last hour the intake is limited to this 0.03 inch, causing runoff totaling 6.25 inches when the rain stops. Seepage to the stream at this time totals 0.07 inch, and movement below root zone 0.06 inch. Had the impeding clay layer been located deeper, more of the surface water would enter and runoff would be less.

During this assumed storm, occurring under known soil conditions, the intake rate is 0.40 inch per hour at first. Then it drops to 0.30 inch in the third hour, and 0.22 inch in the eighth hour. Thus, the rate is nearly constant at the end of this storm on moist soil, being governed largely by characteristics of the soil.

Rates of intake obtained in this manner for row crops or fallow conditions—that is, minimum rates when the soil has been presaturated and for storms where rainfall is above the intake rate—are most useful in giving to the designing engineer basic figures for estimating runoff from watersheds. Where the land condition is improved, the minimum rates may be adjusted upwards on the basis of experimental data on land condition. They should not be confused with water application rates in irrigation guides, since these are for soils at least partly dry and intended for the irrigator who is applying a certain amount of water to the soil. Typical rate-of-intake curves for this soil with good vegetation (bluegrass pasture), in contrast to row crops, show that the rate drops very slowly under grass but much more rapidly for the row crop. On very open soils (with no impeding layer near the surface) the differences are usually greater than shown by these curves. On the tighter soils like the claypans the differences are much less.

After the rain, and as soon as the sun and wind strike the soil, moisture begins to move out. Within 24 hours the newly added water in our sample block of soil has dropped from 1.62 inch to 0.94 inch. Seepage and movement below root zone account for a total of 0.61 inch.

About 0.07 has gone in the form of vapor, some through plants and some directly from the soil.

Ten days later all of the free water has gone—0.57 inch as vapor through plants and from soil, and 1.05 inch as seepage and movement below root zone. This brings us back to where we started: a moist soil but no free water. Another 10 days of sun and wind can be counted on to remove a large part of the capillary moisture and the plants will then begin to signal their need for a new supply.

Much has been published showing how intake of water by soils may be increased, how the surface of a permeable soil can be protected so it is not injured by the impact of beating rains, how organic matter in the soil improves movement of water through it, and how the formation of a plowsole or other dense layer can be prevented. These principles are rapidly being applied in everyday farming operation.

Some things about the occurrence of water on or in the soil cannot be changed very much. Even with excellent cover, a high percent of runoff from tight soils is common. The amount of rain and its intensities at different seasons of the year when vegetation may or may not be luxuriant is an item man cannot control or modify to any appreciable degree. His approach must be that of proper management of the water, the soil, and the vegetation. Experience shows definitely that great improvement is possible.

For wise management of water, soils, and vegetation, all of the many important things that affect their complex relationship must be considered. It is necessary to interpret how one phase of the water cycle affects another: for example, how increased intake of rain affects the total runoff in a stream, or how it is affected by a change in vegetation or by soil characteristics. In the past 25 years we have learned a lot about the wise management of water, soil, and vegetation. We know what will cause an increase in this or that phase of water movement. Mostly our deficiencies in information pertain to **how great** will be the change. It may be that exact prediction of the amount of water discharged by a certain stream in flood flow will be difficult for some years yet, but absolute precision is not required before improvements can be brought about. We are making vast strides in knowledge, and confirming it by the experience accrued over the years.

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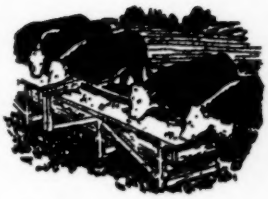

Diverted acres and high prices for feeder cattle are bringing more beef-cow herds to the Midwest. . .

Condensed from Successful Farming

C. E. Hughes

LIVESTOCK producers got quite a surprise when government estimates a year ago reported a 6-percent increase in beef cows over the year before. They got another jolt when they heard that the 12 Midwestern states showed a recent 7-percent rise. The West and Southwest advanced only 2 percent.

Without a doubt, cow-and-calf operators in the Midwest are on the increase. Why? To get away from cold facts and figures, let's check into the operations of a few of the producers who go to make up these government statistics. We'll ask them why they got in, and why they have stayed.

Howard Mullins keeps 33 grade Hereford cows on two farms—one of 217 acres and the other of 116—in De Kalb County, Illinois. Land in Howard's vicinity sells for $400 to $450 an acre, a circumstance that might lift the eyebrows of a skeptic who questions the soundness of such operations on anything but relatively cheap land. On top of this, Mullins paid higher prices four years ago, when starting out, than the cows would bring today.

Despite these seeming drawbacks, Mullins firmly believes that between saving on cost of feeder calves and making profitable use of soil-conserving crops, he is in the cow-herd business to stay.

For the past four years, Mullins has been using a purebred Angus bull on his grade, whiteface cows. He sold his first calf crop, born in 1951, instead of feeding out the calves himself. Feeder prices were simply too tempting to resist. This bunch brought $33.50 per 100 pounds and they averaged 600 pounds.

From carefully kept farm records, it was found that Mullins' 1951 calves—sold in 1952 as feeders—were produced at a

Reprinted by permission from Successful Farming, Des Moines, Iowa, December 1954

feed cost of $12.73 per 100 pounds including $1,147 worth of pasture. This feed cost, of course, was largely for the cows. On the basis of feed representing 60 percent of the total cost of producing a calf, the calves cost $21.22 per 100 pounds all told.

Mullins' calves go through the summer on milk and grass, and after weaning, they are roughed through the winter on hay provided in racks inside the barn. Grain feeding—corn and oats—on a limited scale begins in mid-February, and the calves are on full feed by the time they go to grass. Six weeks of dry-lot feeding in the fall puts the calves in shape for marketing to the best advantage, according to Mullins.

Work is no great consideration in this cow-and-calf enterprise. Cows run on stalk fields all winter and graze on pasture the rest of the year. The calves are dropped on pasture around the first of April. The Angus breeding eliminates the need for dehorning, and Mullins avoids the interference with the main rush of farm work by deferring castration until fall.

Aside from straight dollar-and-cents considerations, Mullins realizes a great deal of plusage in soil fertility. Today he is producing as much corn and oats from 130 acres as previously from 170 acres. The 40-acre reduction in row crops has made possible the production of more hay and pasture.

In nearby Kendall County, Ray Knutson keeps 40 cows, mostly Angus, on a 200-acre farm. His land has more roll than the Mullins place, but farms in this neighborhood still should bring from $300 to $350 an acre—a long way from being cheap land.

Knutson went into the cow-and-calf business 8 years ago to make better use of roughage produced under a soil-conservation program. He also wanted to get away from paying the going price for Western feeders and to free himself from the chore of seeking a banker every fall.

Knutson likes the kind of calf produced under farm conditions and their freedom from shipping fever. Last year, he raised 41 calves from 40 cows. And to the calf program he credits the fact that his corn yields have risen from 35 bushels to 90 bushels per acre.

Haymaking is the chief work peak. To keep down time and labor costs, he stacks baled hay in his pasture fields. As long as the ground is firm enough for a tractor and wagon, he scatters the day's allowance of hay over the field so that the manure will be distributed.

As true with most herd owners, he feeds the cows no grain, except for what they can pick

up in the stalk fields. The cows run on pasture fields the year round, spending the winter on a tree-protected 50-acre tract. Late in the winter, the cows are turned onto a patch of rye which "makes them do better at calving time."

Dairymen, discouraged over high-priced or incompetent help or weary of trying to conform with the ever-tightening sanitary requirements, have contributed a big share to the swing into the beef breeding business.

Ed Neterval and son, Dick, Racine County, Wisconsin, sold off their 36-cow herd of Holstein cows in 1950. After casting about for an alternative to dairying, they chose beef, purchasing at various times 22 head of purebred Angus cows and heifers.

The Netervals realize that their beef-cow investment depreciated an estimated $150 per head during the price slide. But they sold their Holsteins for a $483 average, which wouldn't have been realized had the dairy cows been sold at the time they bought their Angus stock.

The Netervals are tenants on a 240-acre farm. Consequently, they can't tear out, at will, the steel stanchions and pens in the dairy barn, which in itself is far too elaborate for a beef-cow operation. However, to get some use of the barn, they allow the herd to use the central section as a tramp shed during the winter.

Another management handicap is lack of enough pasture, due partly to their ripping up all of the sod crops during the interval between dairy and beef. The Netervals have reseeded part of their land, but they still find it advantageous to keep the cows in the barnlot during the winter, where they receive a half-and-half ration of hay and corn silage.

Breeding is planned so that calves are dropped in March. By their coming early, they are large enough to use more fully the extra milk flow that comes when their mothers are turned out to pasture. Creep feeding of whole oats begins as soon as the calves are big enough to eat and lasts until they are weaned in the fall.

The other herd owners visited in this roundup did not think that creep feeding paid in their commercial beef enterprises, especially when the calves were to be wintered at low cost and turned out to pasture in the spring. However, the advantages of larger size and sleek appearance are enough to tip the scales in favor of creep feeding when the calves are to be sold as breeding stock.

The Netervals admit they miss the milk checks that once came with such convenient regularity, but they look forward to building their herd to 35 or 40 cows. A larger herd will swell some-

what their volume of business without adding materially to the labor and overhead costs.

Charles Holloway and son, Warren, are other dairymen who are trying a hand at beef. The Holloways, however, are combining the two enterprises rather than giving up one for the other.

The Holloways felt the need of a greater volume of business back in 1950. Warren expressed a liking for beef cattle, so they acquired a small herd of Angus cows and heifers. The Holloways expect to sell breeding stock, but so far, they have been castrating and feeding out the males because of the lowered values of bull calves.

There are still plenty of people who insist that, over the long pull, it is cheaper to buy feeders than to raise them. But then we always come back to the statistics mentioned at the very outset—that beef-cow numbers in the Midwestern states have registered a 7-percent increase recently. And we are reminded, too, that this is but the continuation of a trend that started 10 or more years ago in this region of the country.

Five of the states (Ohio, Indiana, South Dakota, Minnesota, and Kansas) have been climbing steadily since 1948, with the first three nearly doubling during the 10 years included in the 1945-54 period.

Why all this, if the chances for a profit are so slim? It seems likely that comparative costs of production between Cornbelt farms and points farther west are not so important as the difference between Cornbelt production costs and what would have to be paid for a Western calf.

Furthermore, and perhaps more important, is the plusage from soil-saving, better crop returns, and the outlet for unsalable roughages. For many producers, these considerations are enough to swing the decision in favor of raising their own calves.

New Farm Aircraft Suggested

Researchers meeting in the second Agricultural Aviation Conference, sponsored by the U.S. Department of Agriculture, recently reported need for a "flying truck" that can dust, spray, haul and dump feed, transport passengers, and perform a dozen other farming and ranching chores. They admit agricultural aviation has grown up in made-over castoffs of military and commercial aviation. But while aviation engineers now aim for greater speed and altitude, the farm researchers see need for better agricultural aircraft to travel at slow speed, fly at low altitude, climp straight up, turn easily and land on small or makeshift airstrips.

Your Dairy Cattle May Need Larger Stalls

Many dairy cows suffer from inadequate stalls too short and too narrow for comfort. . .

Condensed from The Rural New Yorker

A. D. Longhouse and I. D. Porterfield

A recent study in West Virginia shows that the dairy cow of today is a larger animal than her ancestors of some 50 years ago. Yet she is often forced to use a stall suited for the smaller cows of that time.

Frequently, the stall is so small for her that, when she stands, her rear feet are in the gutter and, when she lies down, her udder is on the sharp edge of the platform. When she eats out of the manger she steps up on the platform, carrying manure on her feet. This makes the bedding wet and dirty, and, where the cow lies down, her flanks and udder become begrimed with manure and urine. It always takes more work to keep her clean. Also, the dirty conditions are conducive to high bacteria count in milk, to injuries from slipping, to incidence of mastitis and to the general discomfort of both the cow and the dairyman.

In some instances the large breeds of dairy cattle are being housed in stalls designed for the small breeds. For example, individual stanchion-type stalls were put in when the main barn at the West Virginia University farm was built in 1921; they were 42 inches wide and 66 inches long. These stalls are now too narrow and too short for the farm's Holstein cows. They tend to prevent the Holsteins from attaining maximum production. Skinned hocks, skinned knees and large knots on the flanks and knees result when the cows are kept in them. Such injuries shorten the productive life of the cow. Since the stalls were not large enough to provide comfort for the cows, two comfort-type stalls were placed in the University barn in the Fall of 1947. Two of the larger Holsteins in the herd were put in them. During the following months it was observed that

Reprinted by permission from The Rural New Yorker, New York City, November 6, 1954

these cows stayed cleaner than in previous years, and their production records exceeded all previous lactations.

Studies were then undertaken to determine if the size of the stall required by Holstein cows had any effect on production, comfort injuries and cleanliness. In the Fall of 1948, six additional comfort stalls were placed in the Holstein barn, bringing the total to eight. The comfort stall is 49 inches wide and 84 inches long. At the same time, seven Holstein cows were placed in conventional tie chain stalls (42 by 66 inches) for comparison. The main difference between the two stall types is that the comfort stall has a larger platform with a two-by-four crossbar in the rear. Each Fall the cows that were in the comfort stalls the previous year were placed in the chain stalls and those in the tie chain stalls were moved to the comfort stalls; their places were changed for comparison purposes.

All cows in the Holstein herd were fed hay and silage in approximately the same amounts plus a 12 per cent digestible protein grain mixture. They were fed grain according to their production, with a maximum of 16 pounds per day. Fifteen of the cows in the trial had one lactation in the comfort stall and one in the tie chain stall. Nine of them produced more milk while in the tie chain stall. The nine were the older and larger animals; older cows, especially, may need more room to maintain their production. The younger animals are smaller and may be less affected in milk production by discomfort. For a period averaging 130 days the cows averaged 4,868 pounds of milk while in the tie chain stall and 5,348 pounds of milk while in the comfort stall.

During two Winters, devices were installed in each stall to determine the amount of time each cow spent lying down during a 24-hour period. During the first Winter, the cows in the tie chain stalls averaged eight and eight-tenths hours per day lying down; the cows in the comfort stalls averaged 10.2 hours. During the second year, the cows in the tie chain stalls averaged lying down 7.51 hours per day and the cows in the comfort stalls 10.65 hours.

The cows were examined at least three times each week in the Winter for bruised hocks, skinned knees, injuries caused from lying on the crossbar or by lying on the gutter, and other miscellaneous injuries. During the three-year period, the tie chain stalls sustained 44 injuries as compared to 19 for those in the comfort stalls. Some of the cows in the small tie chain stalls developed knots on their flanks. The only possible explanation for this was

that the stalls were too narrow and the cows injured their sides on the stall partitions while getting up or lying down. One cow in the tie chain stall had a smashed teat.

During the experiment there arose a belief that the comfort stall would require less bedding because of the crossbar's retaining bedding beneath the cow. By measuring the amount of bedding required per stall each day, however, it was found that there was no difference between the stalls of the two types in the amount of bedding used. Even though the comfort stall platforms had an area of 28.5 square feet as compared to the tie chain stall's platform area of 19.2 square feet, the comfort stall did not require more bedding than the tie chain stall.

During the trials the cows were also observed for cleanliness. All visible manure was removed from the bodies of the cows, and their tails and flanks were washed at the beginning of each trial; then they were allowed to go without being brushed or curried for 14 days. Each day the cows were scored for cleanliness. The cows in the larger stalls remained cleaner.

Heavy Speculation in Soybeans

Speculation in soybeans has expanded with astonishing rapidity. Public imagination has been stirred by tales of big speculative gains. There have been whispered stories of new commercial and scientific "miracles" to come from the soybean. Market advisory sheets have pounded the drums for a new crop of amateur speculators. Almost like a chain letter craze, soybean futures speculation has spread until all levels of society, from workman to educator, have been participating.

Hence wheat is no longer the speculative king. Soybeans have taken over. Last year, for example, nearly **six billion bushels of soybeans were traded in the futures market, against an actual crop of 268,528,000.** This would indicate that the volume of futures trading was over 22 times the total of the actual crop.

Some officials have expressed concern. On a market in a downtrend the dangers of such volume of speculation are frightening from a farmer's viewpoint. A broad liquid futures market is desirable for hedging purposes, but it requires no such heavy public participation, it is stated by corn belt congressmen.

Soybean Newsletter

Care at Farrowing Saves More Pigs

University of Wisconsin

ANYWHERE from half to three-fourths of the pigs that never get to market die within the first two days after farrowing.

So H. L. Self, Wisconsin, swine specialist says the best assurance of getting all your pigs to market is to be there when they're born.

Chief cause of loss, Self says, comes from pigs being laid on by the sow—and baby pigs are most apt to be killed by a sow that is too fat or irritable. Best way to prevent this is by putting the newborn pigs in a warm box until the sow is through farrowing.

Lack of heat is another reason baby pigs don't survive. So be sure the farrowing pen, or a small part of it, is kept warm by a heat lamp or other heat source. A good practice is to keep an area about three feet in diameter at a temperature of 70 to 80 degrees.

A jug of hot water is another good source of heat, but Self warns to wrap the jug in burlap. Newborn pigs aren't sensitive to heat and may get burned.

Here are some other recommendations Self makes to insure a high survival:

1. Stay with the sow when the pigs are born, but help out only if needed.

2. Wipe newborn pigs clean and dry. Make sure the nose and mouth are open so the pigs can breathe.

3. Clip the navel cord to about one and one-half to two inches, and dip it in iodine. Don't cut the cord too short, as this may cause severe bleeding.

4. Cut the needle teeth about half way between the end and the gum line to prevent teat and udder injury to the sow. Use tooth nippers or diagonal pliers, and be careful you don't damage the gums.

5. Return the litter to the sow as soon as she has settled down, and see that all pigs nurse within two hours after birth.

Self also advises earmarking all newborn pigs. This will help you trace the number and size of a litter to their sow. It's the best check, at weaning time, of her producing ability.

Some sows, after a long labor period, may not produce milk. In these cases Self says injecting a hormone (oxytocin) may cause milk to be let down.

HOW TO CUT PRODUCTION COSTS

Spend more to reduce unit cost is good farm management. . .

Condensed from Michigan Farm Economics

C. R. Hoglund and R. L. Cook

IF they are to operate at a profit, Michigan farmers will have to make greater use of improved production practices in 1955. Machinery, fuel, labor, and other costs of production likely will stay at high levels for the next few years. These continued high costs, accompanied by lower prices for farm products, emphasize the need for efficency.

One way to meet this price squeeze is to use practices that boost crop yields while lowering per-unit costs. The extent to which an individual farmer will need to make changes in fertilizer inputs, or production practices, depends on how good a job he is doing now. Very few farmers apply the most profitable amount of fertilizer to all crops.

Some will find it profitable to apply more fertilizer at planting time. Others will find it desirable to apply additional nitrogen or other fertilizer nutrients as a side-or top-dressing. The quantity of barnyard manure applied, the rotation followed, the kind of soil, previous soil treatments, price relationships for fertilizer and farm products—all need to be considered in selecting the proper analysis and rate of application.

Some farmers are not getting full benefit from the fertilizer they now use because of inadequate drainage, lack of lime, a poor rotation, or improper tillage and management practices. According to a study just completed in the Saginaw-Thumb area, in Michigan tile drainage systems have paid for themselves

Reprinted from Michigan Farm Economics,
Michigan State College, East Lansing, Michigan

in less than five years from the increased net returns. The use of a light tillage implement behind the plow, and other minimum tillage practices, are methods of reducing both total and per-unit cost of production. The investment in the additional implement is more than offset by savings from the elimination of separate dragging or discing.

The effect on yields, costs, and net returns per acre of using present production practices and fertilizer rates—or using those recommended—has been calculated for five crops. Those crops are wheat, oats, corn, sugar beets, and alfalfa-brome grass hay. Alfalfa-brome grass hay is used here as an example to show some of the opportunities for reducing unit costs.

No other major Michigan crop is managed as poorly as is rotation meadow. A rather high percentage of farmers fail to establish or to maintain good stands of alfalfa-brome grass. A study of forage production practices on about 125 dairy farms in southern Michigan in 1954 showed that about a third of the first-year, and almost half of the second-year, alfalfa-brome grass stands rated either fair or poor. Less than one-fourth of the stands found on these farms were more than three years old. These older stands were generally high in brome grass, quack grass, and weeds.

Yields of alfalfa-brome grass hay have been very low in Michigan in recent years, averaging only 1.8 tons per acre (basis: two cuttings). On a large percentage of farms, the second cutting is used for pasture. Hay yields are low on many farms because of a lack of lime. Based on soil tests in the areas where alfalfa-brome grass is produced, it would appear that farmers, as an average, are using only slightly more than one-half as much lime as is needed for best results. Inadequate amounts or the wrong analysis of fertilizer, used both at planting time and later, contribute to poor stands—and poor yields. Less than 25 percent of the dairy farmers in the 1954 study top-dressed their first- and second-year alfalfa-brome grass stands.

Alfalfa-brome grass hay yields, on a statewide basis, could be increased by about 40 percent—or to 2.5 tons per acre. Improved drainage, use of adequate quantities of lime, use of adapted seed, correct seedbed preparation, and timely planting could do it. This assumes no change in rate of application of fertilizer, and is based on 2 cuttings harvested for hay.

If farmers made no changes in their production 200 pounds of fertilizer as top dressing, instead of the 55 pounds which they now

average—they would expect to increase yields of alfalfa-brome grass hay to 2.4 tons. By adopting all recommended practices, including good drainage and the application of 200 pounds of fertilizer on each acre, farmers could push yields to an average of 3.2 tons per acre.

It costs farmers more money per acre in following recommended practices. Expenditures for drainage, lime, and other improvements are especially important in reducing unit costs per alfalfa-brome grass hay. By spending annually about $5.00 per acre in extra costs for drainage, lime, and other recommended practices, farmers could expect to harvest an additional 0.7 ton of hay. Spending an extra $6.00 for fertilizer, but making no change in practices, would increase hay yields by 0.6 ton per acre. The combined effect of following all recommended practices, and using recommended quantities of fertilizer, would be a 1.4 ton increase in yields—and a $3.50 reduction in unit costs per ton.

Unit costs of producing wheat, oats, corn, and sugar beets can be reduced by as much as 16 to 26 percent by making greater use of practices that have proved profitable. This will be especially important during 1955 in bringing production costs per unit down into line with prices received for farm products.

Wheat Producers Compete with Huge Carryover in '55

Wheat growers will heap their 1955 production on an estimated national carryover of some 1,000,000,000 bushels. And, as a result, the government's support program is expected to hold up the price.

Based on current prospects, carryover stocks probably will be reduced during the 1954-55 marketing year with further cuts due the following year. Total wheat supplies for the current marketing year will approach 1,884,000,000 bushels, the largest in history.

Economists expect wheat exports to rise above last year. They say domestic consumption and exports are expected to top the 850,000,000 bushel crop in prospect for '55, making possible the reduction in carryover stocks.

Under the present farm program, wheat grown must be supported by parity between 82.5 and 90 percent. The national support level for the 1954 crop was $2.24 a bushel. The support this year cannot go below $2.06 a bushel.

Texas A.&M.

BIGGER YIELDS WITH BAND SEEDING

Tests show you can get more production from less seed and fertilizer. . .

Condensed from
Western Dairy Journal

BAND seeding of grasses and legumes is fast becoming a regular practice on western dairy farms. Dairymen using this system have found they get hardier plants with better drought resistance, much lower seeding and fertilizing requirements, and greater yields of better quality forage.

Band seeding is a method of seed placement using conventional grain drills. Small grass and legume seeds are placed one inch to two inches directly above a concentrated band of fertilizer. After the seed has germinated, the young seedling must depend on a very small tender root system. By band seeding, all of the fertilizer is placed very close to the seed and is more readily available to the young seedling.

Big Savings. Agricultural experiment stations have run trials on band seeding. All of them report considerable savings in seed requirements and one station reported a sizable fertilizer saving (between 30 and 50%).

The USDA ran a comparative test at Beltsville to compare band seeding with the conventional method of broadcasting seed and fertilizer. On the broadcasting plot, 8 lb. of tall fescue, 2 lb. of Ladino clover, and 750 lb. of 3-12-6 fertilizer per acre produced 1,439 lb. per acre of dry, weed free forage on first cutting. Band seeding at

Reprinted by permission from Western Dairy Journal, Union Stock Yards, Los Angeles, California, December 1, 1954

the same application rate produced 3,331 lb. or over twice as much roughage for the same cost.

More production with less than half the fertilizer and seed; band seeding at much lower rates of only 4 lb. of tall fescue, 1 lb. of Ladino clover and only 250 lb. of 3-12-6 fertilizer produced 1,855 lb. of roughage. Band seeding alone made the difference in producing 416 lb. of roughage per acre from just one-half as much seed and one-third the fertilizer.

Hardier Seedlings. A study conducted over a three year period at Michigan State College emphasizes the stimulative effect of band seeding on getting the young seedlings off to a very rapid start.

Michigan State used controlled greenhouse studies with radio active phosphorus to measure the effect of distance between fertilizer and the seed on plant vigor. One month after seeding, alfalfa seedlings directly over the fertilizer band had received 98% of their phosphorus from the band of radio active phosphorus whereas seedlings two inches away had received only 15% and those four inches away had received none from this source. Even two months after seeding those seedlings directly over the band obtained 77% of their phosphorus from the fertilizer in contrast to 50% for those two inches away, and 7% for those four inches away.

This rapid absorption of phosphorus by the young seedling explains very clearly why many dairymen who are now using band seeding continue to praise the increased vitality and rapid growth of band seeded legumes and grasses.

Cuts Weed Growth. Extensive work over the past five years at experiment stations highlight one other definite advantage of band seeding. Since all of the fertilizer is placed for ready accessibility of the seeds, it is by this same method not readily available to promote weed growth, as we find in broadcasting. Dairymen report a noticeable decline in weed growth, and consequently better pastures and hay, after turning to band seeding.

Another advantage of band seeding is the fact that it does not require a large investment in new equipment to do the job. Conventional grain drills equipped with grass seeding boxes are easily adapted to band seeding. Conversion kits are now available and are universally adaptable to all drills at a cost of about sixteen dollars. With adaptable equipment now available, your grain drill can be converted to band seeding in about two and a half hours time.

Regardless of the time of seeding, band seeding will usually

fit into your operation. If seeding with oats or barley as a nurse crop, the grain and fertilizer are applied in the usual manner. The band seeding attachment on the drill will then place the fine grass seed in the proper location directly above the fertilizer band. Controlled dropping with the band seeding kit 10 inches behind the fertilizer shoe (opening) insures light coverage and good germination. After seeding the ground should be firmed with a roller or cultipacked to insure covering seeds and giving seeds a good root hold. Follow the modern practice of firming the ground in the same direction in which it was seeded.

Caged Laying Hens Produce Satisfactorily

Results of one-year's experiments conducted at South Carolina Agricultural Experiment Station show that laying hens housed in cages produced slightly more eggs than did similar birds housed on the floor.

C. L. Morgan, head of the Poultry Department, points out that the caged birds were housed in 10- by 18-inch cages located in an open-front shed-roof structure which was covered with aluminum roofing. The birds kept on the floor were housed in a wood-floored pen in a conventional shed-roof house, semi-open front with rear ventilation covered with galvanized roofing.

According to Professor Morgan, feed used in this experiment consisted of an all-mash laying ration supplied free choice with oyster shell and granite grit.

At the end of the experiment, which ran for 40 weeks, the 48 Single Comb White Leghorn hens in cages had averaged laying a total of 183 eggs each as compared to an average of 167 eggs each for the same number of Single Comb White Leghorn hens housed on the floor.

Feed consumption per dozen eggs for the two groups was 4.71 pounds for the birds in the cages and 4.99 pounds for the birds on the floor. Mortality in the two groups was approximately the same.

Professor Morgan points out that, although there was a slight advantage in both egg production and feed efficiency for the hens housed in cages, these results cover only one experiment. He says that further tests with a large number of birds will be necessary to establish the true values of the two systems of management.

South Carolina Extension

DEEP CULTIVATION DOESN'T PAY

Corn yields tell the story. . .

Condensed from The Farmer

HOW much damage is done by deep cultivation of corn?

Will pruning a few roots with deep running, pointed cultivator shovels make any difference in corn yields?

If you had driven past the Levern Wilker farm in Steele County, Minn. in June or early July last summer you might have seen from one to four men on hands and knees trying to dig out an answer to how much root pruning is done by deep cultivation. Using an ice pick they took soil away from the plants bit by bit and exposed the roots.

Dr. Harold E. Jones, Minnesota extension soils specialist; Russell Gute, county agent and two Owatonna, Minn., agricultural teachers joined with Mr. Wilker in trying to answer questions about corn cultivation.

Shallow cultivation was done with sweep shovels at a depth of not more than three inches. Deep cultivation was done with pointed shovels at depths of from five to six inches. Cultivation dates were June 7th, June 25th, and July 7th.

A few days ago yield samples were taken from the plots, and this is what was found:

Corn cultivated shallow three times made 112 bushels per acre.

Corn cultivated deep three times made 100 bushels per acre.

There were these other variations in cultivation practices:

Cultivated deep the first time, then shallow the next two times, the yield was 103 bushels.

Cultivated shallow, then deep, then shallow the yield was 99 bushels.

Cultivated deep, then shallow, then deep the yield was 105 bushels.

Results of the latter practice are interesting because the practice is common. It is assumed that deep cultivation the first time will do little root

Reprinted by permission from The Farmer, St. Paul, Minnesota, October 16, 1954

damage because roots haven't pushed out far between the rows. Actually they have pushed out far enough to be in the track of the deep, sharp pointed shovels. At time of second cultivation it is assumed that the roots have pushed out far enough to be hurt so that cultivation commonly is shallow. Then the third time over when the corn is laid by, and dirt is thrown over weeds in the rows, the cultivator shovels are put down deep, and there is generally little worry about the depth because it is assumed that the roots are too deep to be reached.

Although the results of this experiment do not show any very great differences that can be charged to deep cultivation, they do show differences enough to prove that there is no advantage in cultivating deeply. Results also show that deep cultivation is likely to result in much greater yield depression if corn is checked and cross-cultivated.

Baits Control City Flies

Widespread use of the new, effective insecticidal baits against flies is predicted by Dr. J. O. Rowell, entomologist at Virginia Polytechnic Institute.

Developed originally to control insecticide-resistant flies on the farm, the baits are proving equally as deadly to urban-type houseflies and blowflies.

Dr. Rowell says several of the chemicals have given nearly perfect control in tests conducted by the U.S. Department of Agriculture.

At a rendering plant that processed dead animals and the refuse of slaughter houses, one bait material reduced the fly population 99% within four hours. At a city dump, control of houseflies and blowflies ranged between 97 and 99% 24 hours after treatment. On garbage and trash piles in an urban slum area, daily treatment provided progressively better control until, at the end of five days, control was 90% or more.

Insecticides used in the test baits were all organic phosphate compounds. Two of the materials, malathion and L 13/59, had been proved effective in earlier tests against resistant flies in dairy barns. Promising new maternals included in the tests were chlorthion and an experimental phosphate. All were greatly diluted in mixtures of molasses, malt, or sugar and water, which served as fly attractants.

Virginia Polytechnic Institute

It Pays to Borrow—

Use it right and borrowed money pays good dividends on the farm. . .

Condensed from The Young Farmer

THERE are a lot of farmers these days who are finding new ways to use an old tool to expand their farming operations and to increase their profits.

This tool is short term credit. And young farmers in particular should study it closely for they will certainly come in contact with it as soon as they start their own farming operations.

Credit, like any other farming implement, requires a skillful operator. If used properly, it may double your annual profits. If unwisely used, it can wipe you out and lead to financial ruin.

According to experts in the farm credit field, the relationship between the farmer and the banker has undergone a significant change during the past 30 years. Farmers used to view short-term credit with mistrust and used it only in the event of an emergency.

The banks, on the other hand, believed the farmer to be a poor credit risk and protected themselves by setting high loan requirements, charging high rates of interest, and foreclosing quickly if the farmer got behind in his payments.

Now, however, the picture has changed. The technological advances over the past few years have stabilized agriculture and made the **capable** farmer a Grade A credit risk.

But at the same time, these advances have raised his requirements for short term, or production, loans.

Today's farmer has large and continuing demands for cash outlay at all seasons of the year and he is fortunate indeed if he never runs short of operating capital.

Many farmers, reluctant to borrow money, meet these shortages of capital by cutting back production. But more and more of them are finding that judi-

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cious use of production loans can keep production—and profits—high.

Here's How It Works

For an example of how this works, let's say you find yourself with a surplus of corn and oats in your grain bins in the spring. Grain prices are down so you look around for alternatives and decide to convert the grain to meat. In the past, you have raised hogs on a year-to-year basis, going in when the market looked good and getting out when it started to slip.

You study the market and decide the prospects for Fall hog prices look good this particular year. You figure that you have about enough grain for 60 feeder pigs and you know where you can buy that many at a good price. But here you run into trouble.

You have just emerged from your annual Spring spending for seed, fertilizer, machinery replacement and repair, taxes, etc. You're short of cash. A quick look at your bankbook shows that you can only write a check for 30 feeders.

This leaves you with two alternatives. You can buy the 30 feeders and sell the remainder of your grain or you can apply for a production loan to buy 30 additional feeders.

Here is where your experience and general know-how come into play. If you are sure you can make money on the first 30 hogs, it stands to reason that you could make almost twice as much money if you had 60 hogs. You would, therefore, be ahead to borrow enough money to purchase the extra 30 feeders and convert your grain to pork.

The Odds Are With You

It is a gamble, certainly, for you can also lose twice as much money, but the odds are with the experienced farm operator. If you know your business and know your markets, the chance that you will fail is pretty slim. And you have an excellent opportunity to make a good net profit on the whole operation.

In general, farmers who borrow money wisely may build their working capital much faster than if they saved it out of income. And the cost of the credit may be only a small part of the increase they get in income.

There are three broad categories in which most short term credit loans fall. The first category is the farm production loan. These loans cover everything involved in keeping up or expanding the production capacity of a farm. This might include the purchase of cattle, feeds, seeds, fertilizer, and machinery, Loans can even be used to pay rent and taxes.

Next are the household loans. Household loans are loans made to help provide the family living.

These loans may be made on furniture, remodeling, or rebuilding a house, paying doctor bills, and anything else which is a part of family expenses.

The last category is the loan to refinance old debts. Borrowing money to pay off debts sounds a little like robbing Peter to pay Paul but it can be a very sensible and economical practice. Scattered debts may be expensive to maintain because of high interest rates and it is often possible to effect big savings by consolidating all debts into one loan. It also helps maintain the family's credit rating in the community.

Credit sources are almost as varied as the ways to which they are put to use. The five main sources are as follows: commercial banks, federal or federally sponsored lending agencies, private merchants, private short term loan companies, and lastly, family, friends, and other private lenders.

Shop Around

It pays to shop around for credit just as you would shop for a piece of machinery. In every community, interest rates and other considerations vary from lender to lender.

Sometimes the other considerations are just as important as the interest rates. For example, how long will it take you to get your loan? Is the reputation of your lender good—or has he been known to pull some shady deals in the past? Would the lender be apt to refinance you if you had a string of bad luck and couldn't quite meet the terms? Or has he a reputation for being quick to foreclose?

Does your lender have a thorough knowledge of agriculture so that he can give you helpful advice and can better understand your farming program? Or is he interested in little else except the frequency and amount of your payments? If you are dealing with family or friends, are you sure you can negotiate a loan successfully without losing their friendship?

All of these points should be considered before you decide where to apply for a loan.

How do you go about actually borrowing money? Used to be that, as the saying went, "The only way you can borrow money is if you have so much you don't need any more." Well, that's changed. You can't just walk into a bank and pick up all the cash you need, but credit is easier to obtain now than it has been for years.

According to Dr. William L. Cavort, Farm Credit Administration of St. Paul, Minnesota and one of the top experts in the field of farm credit, there is no shortage of available credit. But there is a shortage of farmers with sufficient skill in farming and money management to

warrant the trust of the lender.

Your problem, therefore, lies in convincing the lender that you are a good risk.

The best way to do this is to show him the records of your past achievements and accomplishments. Before you stop in to see the lender, make up a balance sheet showing the following:

1. Amount and type of experience you have had.
2. Your farm-management plan.
3. A complete financial picture, including the following:
   a. Net worth (livestock, machinery, land, etc.; accounts receivable, cash in hand.)
   b. Liabilities (all debts outstanding.)
   c. Itemized estimated annual income.
   d. Itemized annual production expenses.
   e. Fixed annual expenses (insurance, food, living expenses, etc. that you must pay out regardless of what you do.)
4. Why you want your loan—how it will help increase your net worth.
5. What your system of repayment will be.

Helps You, Too

Preparing this statement gives you a clearer picture of your own financial situation. And it gives you a chance to show the lender your record books and puts your managerial skill on display.

After you have laid your cards on the table, it is up to the lender to decide if he wants to risk his money by loaning it to you. Remember that he makes his living by lending money and he will certainly make your loan if he feels that you are not taking a long chance.

Some lenders are more cautious than others, however, so don't be discouraged by one turn-down — keep shopping—but give the lender's reasons for turning you down some careful thought. He might be right.

And, if your application is rejected by all of the common lending agencies, be extremely cautious about accepting a loan from a private lender who charges you high interest rates and demands an excessive amount of collateral.

The people who said "no" are experts in forecasting a farmer's ability to repay a loan and if they all turn you down, you'd better re-examine your position and look around for an alternative move.

There is always the question of how much you can safely borrow. That, of course, varies with each individual case. Dr. Cavert, however, has some advice that applies to almost everyone. Never borrow so much money on a production loan that the

loss of it would cripple your farming operations. A lot of things can happen between borrowing time and repayment time and you should never gamble everything on your luck.

There are several people in your neighborhood who will be happy to give you good financial advice. A good place to start is your local banker. He usually is in close touch with agriculture. And some banks even have agricultural representatives who constantly work with farm loans.

Help Is Available

Besides your local bank, there are sure to be several governmental agencies and cooperative credit associations located in your county. The secretaries of these groups should be able to give you valuable assistance in working out a credit program.

For example, there is the Farmers Home Administration (FHA), the National Farm Loan Association (Federal Land Bank), the Production Credit Association (PCA), and the local Veterans' Administration offices. All will be happy to talk over your problems with you.

And when you're looking for assistance, don't overlook your county agent and local Vo-Ag instructor. They can help you estimate the profit possibilities on your farming program.

The usual pattern followed by young farmers these days is to start borrowing money from the banker early—sometimes when they are still in high school—to finance a small farming program. These programs offer a wonderful opportunity for the young farmer to start building his credit rating as well as to get a start in the farm business.

He also has a chance to learn how to use credit and to show the lender he can turn a profit from borrowed money.

Handle With Care

Alvin Thue, agricultural representative for the Worthington National Bank, Worthington, Minn., gives this advice on handling borrowed money:

a. Keep accurate records of all financial dealings.
b. Live up to the terms of the agreement.
c. When you sell an animal on which a loan has been made, be sure the lender is notified and is paid his share.
d. If you can't make a payment on the specified date, let the lender know in advance and give him the reason for the delay.
e. Try to show financial progress each year.

Above all, urges Thue, play fair with your lender.

To which William Cavert adds, "And live within your income."

The lender wants you to get ahead because that means more business for him. The best way you can show him that you are

capable of climbing the financial ladder is to keep increasing your share of each project you finance.

The farmer who knows how to use credit and who knows his farming business, won't have any trouble getting credit year after year.

And the farmer who uses his credit to finance a carefully planned and executed program can, literally, make those borrowed dollars pay big dividends.

Direct Loans Best For Machinery Purchases

Farmers who borrow money to buy new machinery should consider a direct loan—it has several advantages, says a Minnesota agricultural economist.

The economist, Reynold P. Dahl, said that interest on a direct loan may be lower because bankers usually charge simple interest—that is, after the farmer's first payment on the loan's principal, interest is charged only on the remainder. But, on contracts, interest is sometimes figured in advance and added to the whole principal of the loan—thus, the farmer also pays "interest on his interest."

Such interest figured in advance may make total interest much higher, Dahl said. On a $1,200 loan to be paid back in 12 monthly installments at 6 per cent, the total "simple interest" payment would be $39. But if interest is charged in advance and added to the principal, the total is nearly twice as much—$72.

Another direct loan advantage is that the farmer may be in a stronger bargaining position if he comes to the machinery dealer with his financing all worked out. He can then bargain with cash in hand even though he borrows from a bank.

It's also an advantage to get a machinery loan from the same place a farmer gets his other production credit. If he gets all his non-real estate credit from one lender, he will be better able to keep a close eye on the type and size of such debts.

A fourth advantage: in a direct loan, the farmer gets title to the machinery. With a contract, title remains with the dealer and he can take back the machinery without foreclosing.

It's not all one-sided, however—contracts have advantages, too, Dahl points out. For example, the sales contract may give a farmer definite assurance of a longer time to pay off the loan. Nevertheless, Dahl says, advantages of direct loans probably outweight those of contract-type.

University Farm News

Bamboo: Big Grass of Many Uses

U.S.D.A. scientists say bamboo may prove a very profitable crop in areas where it can be grown successfully. . .

Condensed from The Southern Planter

BAMBOO, fast-growing grass of a thousand uses, may be just the crop for some of the Southern coastal plain's relatively unproductive land.

A number of desirable bamboo species will grow in this country along a section of the Coastal Plain extending from Eastern Virginia to Southeast Texas. These bamboos favor some freezing temperatures, but not under 5 degrees F. Thirty-seven species are now being grown in the South, mostly in small groves, for economic use.

The USDA-ARS Plant Introduction Station at Savannah, Georgia, and three cooperative research organizations are evaluating the bamboo species that are climatically adapted to the Southeast as to uses for the crop. And they are sizing up the market potential for each purpose.

Bamboo is already being used in making such diverse products as furniture, fishing poles, flag poles, boat masts, garden and orchard poles and stakes, radio antenna poles, ladders, trellises, and decorative fences—most of them relatively minor outlets. As a result of surveys of bamboo's market potential, made under contract for ARS, engineers of the Georgia Institute of Technology have recommended conducting a thorough study of the economic possibilities of bamboo for paper pulp. The Chinese have made paper from bamboo for centuries.

The rather high average yield —8 or 9 tons per acre per year— of the timber bamboo **Phylostachys bambusoides** at the Savannah station is impressive. The engineers recommended sizable plantings of suitable species for pilot-plant study of both production and pulping, as well as study of bamboo's physical properties in relation to curing and processing methods.

The non-profit Herty Founda-

Reprinted by permission from The Southern Planter, Richmond, Virginia, October 1964

tion at Savannah, Georgia, demonstrated that high-grade paper and newsprint can be made from bamboo. Under research contract with ARS, the foundation is studying fiber length and pulping properties of species at the Plant Introduction Station.

The Clemson College Engineering Experiment Station, also under contract with ARS, is studying the potential uses of bamboo in construction. That station demonstrated the effectiveness of bamboo reinforcing in light concrete structures and is studying physical characteristics of the plant as a guide to additional new uses.

New hardware designs for fastening the poles together should improve the quality of bamboo furniture, ladders, trellises and fences and afford a larger market where one already exists. The domestic food trade's demand for bamboo sprouts ranges up to $500,000 a year.

In the long run, however, the South's opportunity to capture any of these markets depends on its ability to compete successfully with off-shore suppliers.

Safety Hints For Woodlot Logging

Logging in the farm woodlot is only as safe as the logger makes it.

That's the warning of R. C. Swanson, farm safety specialist at Wisconsin. He says that while modern equipment makes the job a lot easier, it's wise to keep an eye on the same safety precautions that were popular in the old "ax and crosscut saw" days.

For instance, it's still important to notch a tree before falling it. Cut the notch on the side of the tree facing the direction you want the tree to fall. Then make the main cut on the opposite side of the tree several inches above the notch. Stop the main cut just short of the notch. This leaves a hinge of wood that guides the falling tree, Swanson says. You'll probably have to wedge the tree over.

Dead branches are another hazard to watch for. They can fall from the tree you're working on, or from nearby trees that get hit by the one that's falling. That's where steel helmets help. They give some protection to your head from falling or other flying objects.

Woods are often hilly. And Swanson says if you're using your tractor it's a good idea to get the wheels wide apart. That way there's less danger of tipping over. Swanson says the advice given to swimmers applies to loggers—don't work in the woods alone.

University of Wisconsin

Don't Neglect the Little Things in Raising Broilers

Even experienced old-timers find that it pays to follow certain management rules . . .

Condensed from Everybodys Poultry Magazine

William H. Wilson

EVERY day in Pennsylvania, which ranks first among all of the 48 states in income from poultry products, more than 20,000 chicks under one week of age die. These chicks die not because of disease, nor because of faulty incubation, but they die because the poultryman failed to do a few of the little things that he knew he should do to properly brood chicks.

It's the little things that make the difference between success and failure in producing a flock of good broilers.

What are these little things in management, particularly as they apply to brooding chicks, that are so important? For reason of classification let us call them "The Five Commandments of Brooding Procedure." Virtually every poultryman knows them. But not every poultryman follows them, all of the time.

1. **Uniform Correct Heat**—You must have a form of heat that will automatically keep the chicks warm 24 hours a day in the climate in which you are brooding them. Chicks started in cold weather should have a 95° temperature where they are located. Chicks started in summer will be all right in a 90° heat. Here's a good system to follow:

Age	Winter	Summer
1st Week	95°	90°
2nd Week	92°	88°
3rd Week	88°	85°
4th Week	85°	80°
5th Week	80°	75°
6th Week	75°	70°

Research work of the USDA at Beltsville, Maryland, has proven that for the best start, chicks

Reprinted by permission from Everybodys Poultry Magazine, Hanover, Pennsylvania, July-August 1954

should have a temperature of 94° to 95°.

Sometime ago I stopped to see a broiler grower whose chicks were four days old. He had a hot water brooding system and, as I recall, a long, two-story house. Even before I stepped into the house, I heard the chicks make that characteristic sound that tells you something is wrong. The grower said he had a very heavy loss and chicks didn't look well at all. He was exactly right! They were pasted, droopy and there were many small chicks. He said the heat was okay, 95°, but the thermometer was 10 inches above the litter and in a well protected warm pocket. I laid a thermometer on the litter at the edge of the hot water pipes and it read a cold 70°. He had a 10 percent loss the first week due to lack of sufficient heat.

Another broiler grower started his chicks on a cold windy winter day without a brooder guard because he hadn't used a brooder guard on his last flock started in August.

These are only a few of the many ways that poultrymen penalize themselves because of failure to use good, common sense.

2. **The Right Amount of Feeding Space, Availability of Feed**—The first two days it is best to use shallow containers. Some people use picnic plates, egg case cup fillers or chick box lids. Use chick-size feeders to three weeks of age, then change to intermediate size, and finally, broiler-size feeders.

Feeding space needed: Chick feeders—0-3 weeks, 1½ inches per chick, 6 feet of hopper per 100 chicks. Intermediate feeders —3-6 weeks, 2 inches per chick, 8 feet of hopper per 100 chicks. Broiler size—6-12 weeks, 3 inches per chick, 10 feet of hopper per 100 chicks. With automatic feeders, allow one foot of trough length for each 10 to 12 chicks.

Again, one of the little things that makes a difference is having the feed easily available for chicks the first week or 10 days.

I called on a broiler grower last winter whose chicks were three days old. He had a V-type trough about 2 feet from his brooder stoves, running parallel with the brooders. The feeders were placed in a neat row on the side away from the heat. All the chicks had to do to get feed was to cross over the 3-inch high waterer then get back to the heat without being chilled. Needless to say, he had a high starting mortality. The grower said "he wanted to toughen up the chicks." This is not an isolated case.

3. **A Plentiful Supply of Easily Reached Water**—Many chicks die from lack of easily obtained water the first week of the brooding period.

Provide the following water-

ing space: Day-old—One 1-gallon fount per 100 chicks. 3-6 weeks—One 3-gallon fount per 100 chicks. 6 weeks to market age—Two 3-gallon founts per 100 chicks.

Normally, 100 broilers will drink about five gallons of water a day.

The two most common faults are having waterers too far from the heat the first week and changing to automatics before the chicks can find them or are big enough to drink from a different type waterer. I remember a grower calling me on the phone sometime ago. The chicks were about 10 days old and he was having a heavy death loss. He said there wasn't any sign of disease, but they were dying. He had just changed to automatic waterers. I called at his farm and suggested he put the jar founts in the pens again. The loss stopped almost immediately.

4. **Clean Houses and Clean Litters**—I am not an advocate of dirty houses and old litter. There are enough problems to combat without encouraging them by unsanitary practices. Here are some of the risks and disadvantages of old litter: Red mites, fleas, round worms, capilloria worms, black head, inflammation of the eyes from ammonia, greater infection of leucosis.

Any of these will lower the vitality and resistance of the flock.

Perhaps there are periods when old litter can be used a second time for broiler production without undue hazards. However, I think there is always some extra risk involved and that the small saving in labor and material does not justify the risk.

5. **Poultry Know-How**—Some people seem to have this naturally and are intelligent, efficient caretakers from the start. Others acquire it through experience over the years from trial and error. And then there are those who constantly overlook the small details and do not have the temperament or the knack of being successful caretakers.

Whether it is natural skill or an acquired one, it seems to be the fifth wheel that is necessary if one is to find poultry keeping profitable and enjoyable.

The five commandments of brooding procedure just described are all important to the success of any poultry enterprise.

Most Efficient Not Always The Best

Efficiency of operation is also important. However, as I look back over the years I sometimes think efficiency has been given greater consideration than actual welfare of chicks. For example, six to eight years ago the tendency in housing broilers or layers was to have large pens

—10,000 broilers in a pen or several thousand layers seemed to be the desired number and, making for a more efficient unit. Maybe these larger units were more efficient, but they also created more problems. Ventilation was a problem. Control of disease, as well as the hazard of crowding, added to management troubles.

Today many of the long broiler houses now have partitions, making pens of 1,000 to 2,000 birds capacity. Tight partitions are advisable. There may be some advantage to having the top third of the partition removable for summer ventilation. Growers who have added partitions in their broiler houses have reported a lower mortality as well as a lower production cost since they have used smaller pens.

I think a pen housing 1,000 to 2,000 birds for broilers is the most economical unit. For layers, 300 to 400 hens is enough to carry in one pen for most profitable results.

The width of house should not be less than 24 feet nor over 40 feet wide. The house should face the south or as near so as possible. Put enough windows in the back to give some light in winter and good cross ventilation in the summer.

Ventilation is an important factor in efficient growth. The rule to follow is: Does the air smell good to you? If the conditions are pleasant for the caretaker, they are for the chickens. If the fumes drive you out, what about the chickens that are there 24 hours a day? Respiratory diseases and coccidiosis are always more likely to be serious in poorly ventilated houses.

Most poultrymen know what good management practices are. These "little" things are important, however, and must be observed if you are to continue to make money in the poultry business.

Remember this: No other farm animal or bird can grow one pound of meat on two and one-half pounds feed; grow one pound of meat with 90 seconds work; and grow a pound of meat with an overhead investment of one cent to two cents per pound.

Importance of Irrigation

The importance of irrigation in the production of fruits and vegetables cannot be overemphasized, believe members of the Louisiana Agricultural Experiment Station staff. The use of an irrigation system during one dry season can result in returns sufficient to pay for the irrigation system. Only quality fruits and vegetables can compete on a good market. They can be produced only when diseases and insects are controlled.

They Learn to Grow and Sell Grain

4-H Club members in Kansas receive training not only in growing, but in marketing. . .

Condensed from Extension Service Review

Marjorie Ann Tennant

MARKETING activity is a "natural" for the 4-H Club members in Kansas, leading wheat producing State of the Nation. With emphasis on grain marketing, especially wheat, 4-H'ers have learned in their crop projects not only production but also the know-how of marketing and processing grain.

"From the seed bin to the table as a slice of bread," is the way Norman V. Whitehair, extension economist in grain marketing at Kansas State College, Manhattan, describes the overall picture of the combined crop projects and the marketing activity. This year almost 3,000 4-H Club members are enrolled in the wheat project.

Kansas agricultural leaders, including the Extension Service and Kansas Wheat Improvement Association, have accomplished much in research and education to increase both the quantity and quality of the Kansas wheat crop. The most recent work has been to determine what varieties of wheat make the types of flour in greatest demand.

The spread of this type of activity to the 4-H Club program is an example of the way in which the Kansas Extension Service is broadening and integrating its programs on production, marketing, and family living. From crops to livestock to home economics projects, the work of the club member is an integral part of the whole extension program.

Three 1-day district wheat shows and tours of grain marketing facilities were the climax of the marketing activity for 4-H Clubs this year. Mr. Whitehair, the three Kansas extension agronomists, and the State 4-H Club department pooled ideas

Reprinted from Extension Service Review, Chicago, Illinois, November 1954

to plan the events. Cooperating with the Extension Service at each show were the American Association of Cereal Chemists, local chambers of commerce and boards of trade, Kansas Wheat Improvement Association, and flour mills and bakeries.

Alice E. Haggans, representative of the Chicago Board of Trade, gave the story of the futures and cash market on each of the wheat show programs. Her discussion gave the 4-H members, their leaders, extension agents, and fathers a background for the visit to the local board of trade.

Whitehair explained the marketing activity and the milling wheat situation in the State. Cereal chemists told the story, "From Wheat to a Loaf of Bread."

A tour of terminal elevators, mills, and bakeries completed the show schedule. The inspection and grading of wheat was one demonstration given for the 4-H'ers and others attending the shows.

Each county was permitted to submit 10 samples of 1954 wheat grown as a 4-H Club project. Each wheat variety was judged as a class. Even though the 4-H wheat project in Kansas recognizes only recommended varieties, weak gluten varieties were accepted at the shows. Observing such entries in samples, milled and baked, gave the club members visual examples of the importance of wheat quality.

Samples for the show were placed in clear glass gallon jars. An additional 5-pound sample was submitted for milling and baking tests. It was necessary to send these samples to the extension agronomists at least 20 days before the show date.

"The shows were planned to encourage greater interest and enrollment in the marketing activity," Whitehair commented. He said further:

"The days' events were arranged to give a variety of related subjects in the educational programs and the maximum amount of information to those attending.

"The actual preparation and showing of the wheat samples by the individual club member was the original interest-getter. After the interest is obtained, the difficult job of giving marketing information is much easier. The shows were set up as educational programs, not competitive events."

The shows were rated as a success, with 375 club members participating. Plans for the future include enlarging the events and adding more in other parts of the State.

Learning activities in marketing show the scope and variety possible in the work. To complete the project, the club member must select and carry out

three of the listed activities. They are as follows:

Visits to and a study of elevators, terminal market operations, railroad grain departments, and Federal inspection of grain on railroad cars are suggested activities. Others include: Listening to and interpreting market news; charting market price trends of major crops, a project for 12 months; making a map of the county and locating farmer cooperatives by types; taking part in seed grading and variety identification schools; and giving talks and demonstrations on grain marketing.

The club member's report includes a record of the activities completed and a 300-word story on "My Experiences in 4-H Grain Marketing Activity." County award winners receive gold medals. The State award is an educational trip to Chicago for two club members. The Chicago Board of Trade is the awards donor.

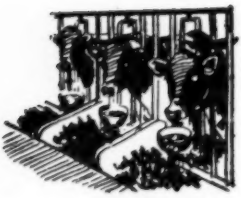
"The objectives of the marketing activity serve as a guide in our planning for the future of this phase of our club program," J. Harold Johnson, State Club leader, explained. "Two of these objectives are to help 4-H Club members get a better understanding of the principles and practices involved in marketing grain and to help them prepare for the responsibilities of rural living by participating in community activities and making contacts with leaders in the field of business."

Increased Farm Exports Sale Expected In 1955

Present prospects appear favorable for increased sale of United States farm products abroad. The Foreign Agricultural Service of the U.S. Department of Agriculture says an increase of as much as 10 per cent in exports of farm products to other countries during the last half of 1954 and the first half of 1955 is held as a possibility. During the preceding year, exports of farm products improved 4 per cent over the low postwar level of 1952-53.

If government surplus disposal programs are successful, the increase in farm exports may even exceed the 10 per cent expected this year, according to FAS. But over the long run, volume of exports will depend more upon high quality and attractive prices in products offered, and upon our ability to meet exacting buyer preferences overseas in an era of competitive foreign marketing. A product selected to meet demand here at home is not necessarily the preferred type by foreign standards.

West Virginia Extension Service



Dairy Bargain

Better feeding and breeding have increased the cash income on this Ohio farm with little cash outlay. . .

Condensed from The Ohio Farmer

Olen V. Mann

CARL Finton of Tuscarawas County, Ohio, has proven that it doesn't take a lot of money to get ahead in the dairy business. For him it has taken good management, breeding to selected sires, getting rid of poor producers and doing a good job of feeding.

During eight years he has increased the milk production from each cow by 4,727 pounds. During the same period he has upped his butterfat production 123 pounds.

Carl started breeding artificially with Central Ohio Breeding Association (COBA) back in 1945 when he sold his own bull. During 1946, his 75 Holsteins had an average production of 9,923 pounds milk and 333 pounds fat. After eight years of using COBA sires only, Carl's Holstein cows averaged 14,650 pounds of milk and 456 pounds of fat for 1953.

Carl sells his milk through the Stark County Milk Producers. Based on their July milk price, his increased production means an added income of $153.44 per cow for 1953 or a herd increase of $2608. The added income has allowed for farm improvements and family vacation trips.

The kind of job this young dairyman has been doing could be duplicated by many an Ohio farmer, Carl says, "All of my improvement has come from breeding and testing." He started testing his herd at about the same time he started using artificial breeding. He has kept accurate records on his feed costs, and can easily see whether he is making a profit.

Carl is one farmer who feels

Reprinted by permission from The Ohio Farmer, Cleveland Ohio, October 2, 1954

that there will always be money in the dairy business for those who get good production and are good managers.

Carl has a farm of 100 acres. He farmed with his father for a number of years, and for the past 18 years has been in business for himself. He has 45 acres of the farm in cropland, 20 acres in pasture, and 35 acres in woodland. Dairying has always been the main source of income, although he does have a few chickens.

Young Finton is the type of farmer who isn't satisfied unless he is doing a good job. He has found that using good sires has increased production and improved the type of his cows. He leaves it up to his technician which bull to use for his cows.

This dairy farmer keeps a close eye on his dairy herd production. A comparison of the DHIA records of his cows and their daughters shows the daughters have given greater amounts of milk than their mothers in 80 per cent of the cases.

Twenty-one COBA daughters have averaged 13,658 pounds of milk and 441 pounds of fat. A 19 daughter-dam comparison in Carl's herd shows an increase in production of 1,265 pounds of milk and 48 pounds of butterfat on an annual basis. There was no selection in comparing records.

The cows have to produce to stay in the herd on the Finton farm. Carl makes a practice of culling heifers from his herd that don't make 350 pounds of butter fat, unless there is some unusual reason for this low production. He thinks his cows are staying in the herd longer than those of most dairymen. This cuts the cost of raising replacement stock.

Carl makes a practice of calling the technician the evening of the day his cow comes in heat. If the technician cannot be reached in the evening, he calls him the first thing the following morning. This has given a 64 per cent conception rate on first service—better than average.

Carl is a good feeder. His cows in milk are fed a 13 per cent ration. However, this will vary from time to time depending on the quality of the feed and roughage. Carl bases the amount of feed he gives each cow on the amount of milk each cow gives, the per cent butterfat, the amount and quality of the roughage she consumes, and her live weight.

The Finton Holsteins graze good bluegrass, plus a rotated pasture made up largely of alfalfa. They are also given mixed hay and corn silage. Hay is fed during the summer and Carl says the result is better production. He isn't worried about not having enough hay for the win-

ter. If he needs it, he will buy it.

Carl built a round concrete watering tank in one of his pasture fields at a total cost of $31.50. It holds 575 gallons. Forms and plans used in the construction were obtained from the local soil conservation district. Carl's tank is fed by his farm pond. He has a float valve on the tank to regulate flow of water. The tank is sloped on the inside to take care of freezing in winter.

For Carl Finton, artificial breeding has been a money-maker, and for his family it has meant better farm living.

Haying Machinery Needs Full Usage

Full usage is needed to make a profit from investments in machinery for harvesting hay or other forage crops, says the University of Kentucky Agricultural Experiment Station. In a study of field choppers, the Experiment Station found that the costs of a ton of forage chopped declined from $8.88 to $3.52 as the use increased from 61 tons to 288 tons a year. A similar reduction in cost was found for pick-up balers.

The report says 125 to 150 tons a year of forage must be handled to justify the purchase of a forage harvester. One study showed a cost of $5.11 a ton when 75 tons of hay were put up with a high-lift buckrake.

Control Cattle Grubs

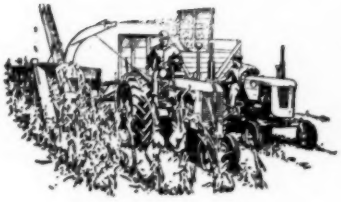
It means money in your pocket if you control cattle grubs. Dairy and beef cattle producers lose millions of dollars annually as a result of grub attacks.

There are three effective ways to control the grubs—wash, dust, or spray. If many cattle are to be treated, the spray method is easier. Make the first treatment about 30 days after the first "bumps" appear on the backs of cattle. Make two more treatments at 30-day intervals. The exact date for starting treatments varies from year to year, and from locality to locality.

Rotenone is the best killing agent to use in controlling the grubs. Ground derris or cube powder containing 5% rotenone, or some commercial rotenone preparation, is usually available through insecticide dealers.

County agents can give details on control.

V.P.I. Newsletter



CORN IRRIGATION PAYS

They are making it work. Here are new ideas on how to go about getting started and what it will cost you. . .

Condensed from Farm Journal

George W. Wormley

BY all odds, irrigation is just about the most talked-about thing in the Corn Belt.

Fred Creal, a 27-year-old farmer in Vigo County, Ind., puts it this way:

"Those July dry spells are what I dread. Gambling on getting million-dollar soakers that put an ear on every stalk is hard on the nerves, and rough on the pocket book.

"I've been putting about $30 worth of fertilizer per acre on my corn ground, but the last two summers, my corn ran out of water, and averaged less than 40 bushels.

"The way I see it, the man who irrigates won't make a killing, but he will be able to protect his investment better.

"If you irrigate, I figure that you can regulate just about everything except the price of No. 2 corn," concludes Creal. He's getting set to irrigate 150 acres of corn from an 80-foot well near the Wabash River.

Hundreds of other farmers are thinking along the same line.

College engineers and irrigation dealers told me that inquiries from farmers are up 100% or more over other years. **"Most of our inquiries**—and we're getting about five times as many as we did last year—are coming from top-notch farmers who are already using every yield-boosting idea in the book," reports Engineer T. L. Willrich, Iowa State College.

"They've put in good drainage, they're using fertilizer, and they're planting thick stands of the best hybrids.

"Because they look on irrigation as the final step, we believe that they're going to succeed in lifting the yield ceiling caused by mid-summer dry spells."

Purdue agronomist G. G.

Reprinted by permission from Farm Journal, Philadelphia, Pennsylvania, June 1954

Williams, who grew up with and studied irrigation in California, agrees with Willrich: "Indiana rainfall records covering the last 50 years, plus recent research, show that many Hoosier farmers can expect to make money irrigating corn—especially on sandy or 'droughty' soils."

In Nebraska, nearly 1,000 farmers have put in irrigation systems during the last year, and more than a million acres are now under irrigation—about 700,000 from streams, 400,000 from wells.

From South Dakota, Engineer J. L. Wiersma reports that "farmers who are trying irrigation are sold on it."

In Minnesota, 28 farmers in Anoka and Sherburn Counties have organized the Minnesota Farmers Irrigation Association, so that they can swap ideas, methods. One of the members, Lawrence Goener, reports: "I've been irrigating about 80 acres of corn for three years now; haven't gotten rich, but I'm showing a profit."

In Illinois, farmers near the Mississippi, Ohio, and Illinois rivers, and along smaller streams in the northern part of the state, are putting in systems. Swamped with requests, the University and the SCS are publishing an irrigator's guide.

Dry Weather isn't the only reason for all of the talk about irrigation. We've learned enough about the moisture needs of corn to make irrigation a surer bet than it was two or three years ago.

For example, we now know that if the root zone has a good supply of moisture at planting time, corn doesn't need much additional water while it's small. **It needs water most from the time it starts tasseling until it finishes silking.** During this three-week period, 100-bushel corn used from a third to a half-inch of water per day for top yields.

After silking, extra water doesn't help much—makes only a few more bushels per acre on most soils. And irrigating after the milk stage is a waste of water and time.

So irrigating corn is no longer a hit-or-miss proposition. If you are thinking about irrigation, here are suggestions that may save you headaches later on. They are ideas gleaned from my talks with farmers, engineers, dealers:

1. Get some sort of priority on your source of water.

"Whatever you do, make your water supply a matter of record when you start to irrigate—even if it's only a driller's certificate," says Nebraska Soil Conservation Service Engineer D. R. Vallicott.

With the big interest in irrigation, a good many states are reviewing their present water laws. New legislation is bound

to come and it's a good idea to establish any priority that you may have on the use of water.

2. Figure on using more labor.

New irrigators get their biggest jolt when they run into the labor requirements for the first time. Farmers report that it takes from one to four hours per acre to uncouple and move pipe, but experienced corn irrigators have it down to no more than 1½ man-hours per acre per move.

3. Will your soil take the water?

Some soils crust over, and soak up about as much water as a tin roof.

You can find out the rate that your top-soil will take water, and whether you have a sub-soil that will give you a drainage problem, by having your Soil Conservation Service technician prepare a soil survey and topographic map.

4. How much will it cost?

Once you know the limits of your soil, water, and labor, you can get an estimate from your dealer.

Most farmers in the Midwest and Eastern states report that the initial cost of their sprinkler systems runs from $50 to $150 an acre. Operating costs are from $20 to $30 per acre per year. Fixed costs—depreciation, interest, taxes—usually range from 5% to 15% of the initial cost.

Most of the engineers agree that it's a good idea to get the whole system from a single dealer, and have him guarantee performance, which most of them will do.

"We're finding that it's usually better to buy a complete system than to get one that depends on your farm tractor for power," says University of Minnesota engineer E. R. Allred.

With a tractor-powered system, you tie up expensive transmission machinery and tires that you could probably put to better use on some other job.

Most engineers and experienced irrigators suggest that you look into diesel or electric power, if you plan to irrigate anywhere near 1,000 hours a season. The reason:

Pump power calls for a long run at a constant rate of speed —there's no need to speed up or slow down.

5. Figures for the long pull. Irrigation is a gamble on most crops in the eastern half of the country, so don't buy a system with the idea that it will pay for itself the first year. You can expect a wet summer about as often as a dry one.

To make irrigation pay on corn, you'll want to go after the biggest yields in the county. The water requirement for 100-bushel corn, or better, is 18 to 23 inches, depending on how well you team up the water with

fertilizer and plant population.

A sprinkler system can pay its way even in a wet year, if the rain isn't too well spaced. Corn will go deep for moisture, **but it does best when it gets water from the top few feet of soil.** In USDA tests at Brookings, S. Dak., the roots got 50% of their moisture from the top foot of soil; 90% from the top three feet.

"Buy irrigation equipment on the same basis that you buy other farm machinery—to get the most possible use out of it every year," suggests Nebraska agricultural engineer L. W. Hurlbut.

"We think we're doing every farmer who asks about irrigation a service when we make him stop and think about all of the problems that he can run into," says University of Illinois engineer Ben F. Muirheid.

"There will always be some who will go overboard, but we're trying to get across the idea that you don't start irrigating because you have an old auto engine back in the shed. You irrigate because you have the water and the soil and the crops to show a profit over a period of years . . . after you've made a sizeable investment."

Creep Feeding Pays Veteran Livestock Raiser

Creep feeding of home-grown grain has earned a firm place in the farming practices of a veteran Texas stockman.

W. R. Parsons sold 50 fat range calves and topped the market at 19 cents a pound for the heavier animals and 17 cents for the lighter ones.

"Had I not fed, the calves would have brought only 15 to 16 cents the day I sold," said Parsons, who has ranched near Crystal City since 1922. And, in addition the calves on creep weighed about 150 pounds more than calves of similar age but not on extra feed.

Parsons' story of success began in late July. The rancher bought milo and hegari from neighboring farmers who were harvesting at the time. The two grains were mixed and ground and feeding was started later in August. He fed the mixture at rates of five pounds of grain to one pound of cottonseed meal.

Parsons has fed range calves in past years but 1954 was the first time for home-grown grains, Adams explained. This mixture made the cheapest but one of the best rations he's ever used, he added.

Each calf ate about 300 pounds of the mixture. The rancher reported a feed cost of about $7.50 per head and a take-home profit of more than $20 per head. *Texas A.&M. College*

4 Tons of Alfalfa from 7-Year-Old Stands

Liming, fertilizer and proper management bring maximum yields of alfalfa. . .

Condensed from
What's New in Farm Science

O. J. Attoe and Emil Truog, Soil Scientists

NOBODY would expect seven-year-old stands of alfalfa to produce much hay. But O. J. Attoe and Emil Truog, Soil Scientists at the University of Wisconsin, harvested alfalfa each year from seedings made in 1947, and still got as much as four tons to the acre each year.

The research men say the secret to such success with alfalfa is the right amount of liming and fertilizer. Tests were carried out in Barron County on Spencer and Antigo silt loam soils.

The tests began in 1942 with application of 1500 pounds of 0-20-20 on each acre to bring the fertility level up to about 75 pounds of available phosphorus and about 200 pounds of available potassium per acre. Five to 10-tons of lime to the acre corrected soil acidity.

In the next five years the fields followed a rotation of corn, oats, and two years of hay. With oats, the fields got 300 pounds per acre of 0-20-20 broadcast and another 200 pounds per acre drilled with the seed.

The rotation was discontinued in 1947, and the fields have been in alfalfa since then. A topdressing of 200 pounds per acre of muriate of potash was put on in the fall of 1950, 1951, and 1952. Some plots were left unfertilized and unlimed to serve as comparison plots.

Cossack alfalfa was used in these tests, as there is no wilt problem in Barron County. However, Attoe says that with an adapted variety—wilt resistant if necessary—together with a good fertilization and liming program on soil at least fairly

Reprinted by permission from Agricultural Experiment Station, Madison, Wisconsin

well drained, these results could be duplicated anywhere in Wisconsin.

Lime and fertilizer costs for the six years of continuous alfalfa production have run about $75 an acre. During this time, some 22 tons of alfalfa per acre were taken from the field. This means the cost of lime and fertilizer was only about $3.40 per ton of hay. Farmers who use manure on their fields could lower this cost, the researchers say. Because of the carry-over effect of the lime and fertilizer, cost of establishing alfalfa on these fields in the future shouldn't be more than about one third the cost of the original establishment, Attoe and Truog say.

The tests have also shown that lime increases the availability of phosphorus naturally present in the soil. Because of this, the researchers say that 1,000 pounds per acre of 0-10-30 would do the job as well as 1,500 pounds of 0-20-20. This would reduce the fertilizer cost about 40 per cent.

School Milk Program Success

Secretary of Agricultural Ezra Taft Benson is "highly pleased" that all of the States are now in this new program to increase milk consumption by school children.

"The speed with which the arrangements were completed (2 months) with all States is a notable achievement," he said. Schools throughout the country have the program in operation, and are serving increased amounts of milk to larger numbers of children. Many other schools are completing final plans for participation.

"Now that all states are in the program," Secretary Benson declared, "I am sure that we will move rapidly toward attaining the ultimate objective of the program—more milk for more children. I hope that all those who have already contributed so much to the successful establishment of the program will cooperate, with equal vigor, in attaining this objective."

The Special School Milk Program to increase milk consumption by children in schools is authorized by the Agricultural Act of 1954 which provides for use of up to $50,000,000 of funds of the Commodity Credit Corporation each year for the next two years for that purpose. It emphasizes the importance of milk as a food for growing children, and reduces over-all costs of milk servings in schools by reimbursing them for a part of the cost of milk served in excess of their former use.

Farm Ranch & Home News

Milk Per Hour, New Gauge for Dairymen

Presenting an entirely new approach to profitable dairy farming. . .

Condensed from Hoard's Dairyman

Tom Wiley

YOU can still make money milking cows if you let More Milk Per Hour work for you.

Take the present price-cost squeeze as an example. How can More Milk Per Hour ease the squeeze? More Milk Per hour can cut your milk costs. It can enable you to produce your milk cheaper. And the less it costs you to produce, the more profit you will have at any given price.

Milk Per Hour is a guide to more profitable dairy farming. Like any useful guide, "M. P. Hour," can tell us two things, where we are now and the right direction to go from here.

Let us say that I am an average New York commercial dairy farmer. My hired man and I milk about 22 cows and ship a little over 150,000 pounds of milk a year. Where am I? According to "M. P. Hour," I am operating at 52 pounds of milk per hour. That is my rating. It is figured in this way:

Two men milking 22 cows equal 11 cows per man. On a dairy farm, each man averages about 1,500 hours a year in the barn and 1,500 hours in the field. Dividing my barn time among 11 cows means that each man works 135 hours with each cow every year. The 22 cows produce a little over 150,000 pounds of milk per year or about 7,000 pounds per cow.

Since we spent 135 hours with each cow to get her 7,000 pounds of milk, our efficiency rating is 7,000/135 or 52 pounds of milk per hour.

The real pay-off; or, rather, lack of pay, comes when you figure the value of the milk produced each hour (at $4 a hundred) and, using today's prices, subtract all costs except labor.

Reprinted by permission from Hoard's Dairyman, Ft. Atkinson, Wisconsin, October 1954

You have just 20 cents left over. Twenty cents an hour, that is what the average New York commercial dairyman was making in 1954.

If I were an average dairy herd improvement association member, the hired man and I would be handling about 26 cows. Thus, we would be spending 115 hours a cow each year. The cows average about 10,000 pounds of milk per year. Our Milk Per Hour rating now is 10,000/115 or 87 pounds.

This means that the average New York D.H.I.A. member makes a can of milk each hour that he works with his cows. What kind of a wage is this at today's costs and $4 milk? Sixty cents an hour!

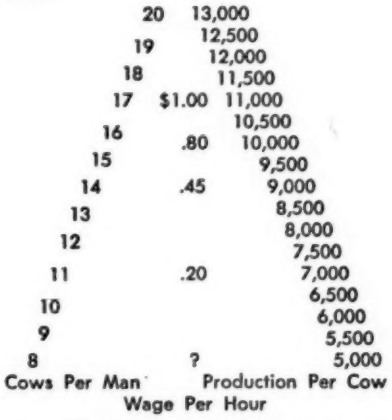
In other words, as an average New York D.H.I.A. member, I made three times as much per hour for doing my dairy barn chores as the average dairyman. Why? Because I increased my Milk Per Hour rating.

Do you know how much you are making this year for milking, feeding, and caring for your cows? If you use it correctly, this chart will tell you.

Two figures are needed:

1. The number of cows **per man** in your barn. please note "per man." If you have 25 cows and two of you do the chores most of the time, that is 12.5 cows per man. Three men handling chores for 45 cows is 15 cows per man.

2. You will also need the average production per cow. Use your D.H.I.A. average, or divide the total pounds of milk you sold to the milk plant last year by the number of cows in the herd.



1. Circle the number of cows **per man** in your barn.

2. Circle the average production of your cows.

3. Connect the two circles with a straight line. The point at which the line crosses the center column is your dairy barn pay.

How about it? Are you making $1 an hour for doing your dairy barn chores? If you are not, what will it take? According to "M. P. Hour," it will require 17 cows per man, producing 11,000 pounds of milk per cow.

That is what it will take . . . and it is a practical goal. It is

within the reach of nearly every commercial dairyman, but to handle that many cows per man you can spend only 80 to 90 hours helping each cow.

Are you interested in what is possible? Agricultural colleges in Vermont, Ohio, Michigan, Illinois and Kentucky report research studies on dairy farms in their areas where good dairymen were handling 25 or more cows per man. These men were spending 60 hours, or less, per cow each year, not even half the time most dairymen spend. And they were getting real production from their cows, too.

Combine with this a herd of cows that will average 15,000 pounds of milk and you will be making $2.50 an hour.

First, Increase Production Per Cow

The best single guide that I know of for getting the first part of the job done is to join the local dairy herd improvement association and follow these suggestions:

1. Feed all the top quality hay the cows will eat; provide good quality silage; feed grain according to milk production, amount, and quality of roughage.

2. Breed cows to the best herd-improving sires available. Freshen in fall. Give 60-day dry period, a calf every 12 to 13 months.

3. Cull low producers and unprofitable cows promptly through D.H.I.A. Remember our goal here is an average of 11,000 pounds of milk per cow.

4. Follow managed milking program. Use mastitis prevention and control measures.

5. Maintain healthy herd, TB tested, Bang's approved, and so forth.

Second, Reduce Hours Per Cow

This part of the job requires very careful thinking and consideration. We must keep in mind that we spend about one-half of our time in the field and one-half in the barn. We are concerned with making more valuable that one-half of our time which we spend in the barn feeding, milking, and caring for our cows.

With this in mind, let us take a look at the chores we have with our cows. Studying a 25-cow herd "on paper," we see that:

Feeding takes 10 per cent time, 20 per cent travel, using 60 tons hay, 100 tons silage, and 30 tons grain.

Bedding and manure removal takes 10 per cent time, 15 per cent travel, for 25 tons bedding and 200 tons manure.

Milking and caring for milk equipment takes 60 per cent time, 45 per cent travel, for 100 tons of milk.

We have, then, a grand total of 515 tons.

This shows that a dairyman

with 25 cows lifts and carries over 500 tons a year, all of it at least once. If it were only once, it would still be a backbreaking job. But to get the hay from the mow to the cow we usually lift it twice.

Silage is handled as much as three times before it gets out of the silo and in front of the cow.

Grain takes two to three handlings, and in 100-pound bags.

Bedding, like hay, is lifted and carried at least twice.

Manure is lifted once or twice.

Milk? Five times or more. Count them. Once to take it out from under the cow, a second time to pour it into the pail, next to carry it to the milk house, again to pour it into a milk can, and then lift the can (115-pound can) into the cooler only to lift it out later for the milk truck. (Speaking of 100-pound bags of grain and 115-pound cans of milk, not even fertilizer is handled in this heavy container any more.)

Is it any wonder our Cornell agricultural economist, Dr. L. C. Cunningham says, "Few jobs in the United States today, including coal mining, now require such physical exertion as put forth in dairy farming."

Certainly, if each man working in the barn is to begin handling 17 cows per year, and in the same number of hours that he has been handling 10, 11, or 12, **the work must be made easier.** And, if we still want that $1 an hour for doing our barn chores, each man must begin handling 17 cows per year. So, let's make the barn operations easier!

Stop Lifting and Carrying

To make chores easier one main idea must be carried out. We must stop lifting and carrying everything to and from our cows. We must stop carrying the hay, silage, grain, bedding, and milkers to the cows, and the milk and manure from them.

How will we do our chores without lifting and carrying all this? Regardless of the type of barn you now have, study each of these methods very carefully. While some are more suited to pen stables, we don't rule one out for a stanchion barn until we are completely sure it is not both possible and practical. Here they are:

Hay—store it on the ground and let the cows eat right out of the mow. If we put the hay overhead, we lift and carry each ton of hay two extra times. Is it worth it?

Silage — store it on the ground, also, and self-feed. It is being done successfully with trench silos, above ground bunker silos, and stack silage. With a tower silo, use a mechanical unloader that empties into a self-feeding bunk or onto

a mechanized belt that moves the silage to the cows. This saves our handling each ton of silage three times.

Ground level storage pays off in stanchion barns as well as pen stables. Especially if you will provide wide feed alleys and convenient cross alleys and use large carts to move such bulky materials as hay, silage, bedding, grain, etc. The carts should be large enough to hold all the material needed to complete the job in one trip.

Milkers—let the cows bring the milk to the milkers. And when they get there, let them stand up on a platform where we can work the easiest. Yes, a milking parlor with elevated stalls. Why should we carry the milkers to the cows and then stoop, squat, and squint to put them on?

Having long been used with pen-type barns, many dairymen are now adding elevated stall milking parlors onto the end or side of their stanchion barns.

Milk—Let pipelines carry the milk from the stanchions or the milking parlor. It is not only easier, but a clean pipeline is more sanitary than an open milk pail no matter how clean the pail is. Let the pipelines put the milk in one big can (bulk can) not a dozen 115-pound cans that we must lift several times. This will save our handling each pound of milk as much as five times.

Grain—When possible have it delivered in bulk. The truck's equipment can put it up over the milking parlor in a big bin. Gravity will bring it down to each feed manger where a metering device will measure out the correct amount for each cow. Or store it on ground level in bulk and have automatic feeders (chicken) carry it up overhead to each manger chute.

Water—For years most of us have been handling it in bulk, through pipelines and with self-feeding devices.

Cows—to take the greatest advantage of these suggestions our cows should be free to move. They should be housed loose—pen stabled. This will save us the work of unstanchioning and restanchioning our cows once or twice each day. Research shows that cows produce just as much milk in a pen barn as in a stanchion. We can expect less hock and udder injuries in the pen barn.

Bedding—store it on ground level right beside the bedded area where we will need it. Some dairymen use their field chopper to chop the straw and blow it over the bedded area. Again, ground level storage saves our lifting and handling the material two or three times.

Don't forget the possibility of using large hand-pushed or

motored carts if bedding must be moved very far.

Manure—in a pen stable we leave it where it falls—bedding it over each day until we are ready to move it with power machinery. Then once, twice, or three times a year we clean out the bedded area and take the manure directly to the fields. Thus, instead of handling the manure once or twice a day it is once or twice a year.

In stanchion barns, gutter cleaners are the answer. The labor saved quickly pays off your investment in this machine which works 365 days per year.

To further increase the ease of doing our dairy barn chores, we must plan each operation to lead smoothly and quickly into the next one.

For example, an ideal barn would allow the cows to move from the bedded area, across a paved barnyard to the feeding area for hay, silage, and water. From there they go to the holding area just outside the milking parlor. Next the cows would move into the parlor to receive their grain and to be milked.

I know these practices are more easily written and spoken than done. On the other hand, they are being used successfully on thousands of dairy farms. The savings in labor or the greater production per hour of labor can write off an investment more rapidly than we might expect. These are practical goals.

Rugged times are here and lie ahead. To prosper under peacetime conditions, we must constantly restudy our dairy operations. If we can gain through change, we s h o u l d change promptly. Wartime profits were not hard to come by. Peacetime profits must be earned through keen business decisions. Habit dairying will provide little or no financial security in the future.

Soybean Prices May Be Lower

George Strayer, Secretary of the American Soybean Association, confirms the statement that we harvested the largest National soybean crop on record in 1954. We cannot use them all but Secretary Strayer says Western Europe and the Orient, particularly Japan, want that surplus but he figures only if prices are in line with the 1954 support price of $2.22 per bushel. Manchuria used to ship beans to Japan but Russia now holds them behind the "iron curtain." Everybody recalls the "squeeze" of last year, so many growers are holding for more money, probably only to learn later on that we are on a "down" market with present prices a half dollar or so above what those who seal can net.

Do-Well Agricultural Letter

PRIMER FOR

Pasture Renovation

Profitable returns obtainable from renovated pastures. . .

Condensed from Science for the Farmer

Burton S. Horne & John B. Washko, Pennsylvania State University

EFFECTIVE pasture renovation includes: 1. soil testing, 2. spreading of lime, 3. killing unproductive grass and weeds, 4. application of fertilizer, 5. selection and seeding of adapted grass-legume mixture, 6. proper management of newly established meadow, including annual fertilizer applications.

Prior to any tillage operation, a soil sample of the pasture field should be obtained. Instructions for taking a soil sample can be obtained from any county agent. Results of the soil test will establish the amounts of lime and fertilizer necessary for vigorous plant growth.

The required amount of lime should be spread prior to the initial breakup. This is desirable because the lime then will be well worked into the soil. Make use of the service of "ready spread" lime. It has many advantages over the "spread - it - yourself" operation. Many old pastures are on steep hillsides which pose problems if the proper equipment for hillside work is not available.

Start Tillage in Midsummer

The tillage operations may be considered under two phases: "initial breakup" and "later workings." The initial breakup is done in July or August. This usually is the driest part of the growing season and the killing power of the sun can be used to best advantage. A good kill of the old sod is necessary. Competition between the new seeding and the old vegetation must be eliminated to insure a successful stand.

The intent of the initial breakup is to cut up the old

Reprinted from Science for the Farmer, State College, Pennsylvania

vegetation and leave it on or near the soil surface as a trash mulch. This is best accomplished by working the soil 3 or 4 inches deep with a heavy disk, chisel, or field cultivator.

The heavy, single gang, cutaway disk harrow is the tool that does the most satisfactory job under the widest range of conditions. It performs well on brushy land, rough hummocky surfaces, and on rocky soil. Its effectiveness varies with the amount of brush to be subdued, but repeated operations over the surface eventually result in a satisfactory seedbed. However, the heavy duty disk plowing harrow may be out of reach of the farmer, both in initial investment and in power requirement. Farmers in some areas are finding it economical to have the initial breakup of old pasture done on a custom basis.

Field cultivators or field tillers also may be used for the initial breakup. Generally speaking, all types of field cultivators perform well when brush or heavy root growth are not present. Clogging will occur in all types when the brush has not been chopped or shredded.

A disk plow will operate satisfactorily on very rough pastures. It will roll over rocks and other obstructions without damage, and, by plowing shallow, the trash mulch is not buried. The moldboard plow is an excellent tool for subduing old sod but has limited usefulness on rocky and rough ground. It will bury the trash mulch and leave only a bare surface subject to erosion during the winter layover. If the soil is shallow, raw subsoil will be turned up and the establishment of new grass seedings is difficult in infertile subsoil.

Chemicals Kill Sod

Chemicals instead of tillage may be used to help kill the old sod. Sodium trichloroacetate (TCA) applied at the rate of 25 pounds per acre in 10 to 20 gallons of water is effective. Several other chemical compounds show promise, but require further testing before they can be recommended. A wetting agent, 2 ounces of any of the detergent type washday powders, and 8 ounces of 2,4-D, to control the broadleafed weeds, improves the spray mixture.

Complete coverage with the spray of all vegetation present is necessary for a good kill. Spraying is ineffective during periods of prolonged drought. TCA temporarily sterilizes the soil, but its toxic effects disappear by the time of spring seeding. Use of this chemical does not substitute for disking entirely, rather it cuts down on the number of diskings needed in seedbed preparation.

After the vegetation is chem-

ically killed, two or more diskings with an ordinary farm disk are required to cut up the dead sod and to insure seed-soil contact.

Later workings may be done about two weeks apart. The object is to further cut up the sod clumps and stir them for quick drying and killing. Rainfall encourages later vegetative growth that may appear. An ordinary farm disk harrow, a spring tooth harrow, or field tiller can be used to destroy new growth. The seedbed should be in such shape before winter that only light tillage in the spring will be needed to work in fertilizer and freshen the surface before seeding.

The kind of fertilizer to apply and the amount required will be determined by the soil tests. It should be thoroughly worked into the soil. Fertilizer usually is spread after the initial breakup and before seeding.

Adapted and high yielding species should be selected for the production of high quality forage. For this reason the taller growing grasses and legumes are chosen in preference to Kentucky bluegrass and White clover. Bluegrass volunteers and comes in sooner or later anyway; hence there is seldom need to sow it.

A. For Well-Drained Soils:

1. Orchardgrass 4 pounds; timothy 4; red clover 2; alsike clover 1; and ladino clover 1.

2. Smooth bromegrass 8 pounds; timothy 4; red clover 2; alsike clover 1; and ladino clover 1.

B. For Poorly-Drained Soils:

1. Reed canary grass 8 pounds; timothy 4, alsike clover 2; and ladino clover 1.

Reed canary grass 8 pounds and birdsfoot trefoil 5.

C. For Droughty Soils:

Timothy 4 pounds and birdsfoot trefoil 5.

Mixtures with ladino clover should be limited to land which can be worked easily and which is located reasonably close to the barn because this legume needs good management for survival. Mixtures with birdsfoot trefoil should be favored over ladino clover under conditions which may be too wet or too droughty for ladino. Trefoil is preferred for land which cannot be reseeded very often because of roughness or because it is a long way from the barn and unhandy for proper management. For pasture purposes the broader-leafed, more prostrate form such as the New York type, Empire, is better suited than the erect, taller-growing European types.

Seed in Spring

Since killing of the old sod seldom can be accomplished in time for successful fall seedings, spring is the best time for reseeding. On soils with poor internal drainage and where soil

erosion isn't a factor, all tillage and fertilizing operations can be completed in the fall and seeding done in the early spring when the soil is honeycombed with frost.

A cyclone or wheelbarrow seeder works well for such an operation. Alternate freezing and thawing will help cover the seed. On the better drained soils one or more tillage operations may be necessary prior to seeding to break up the soil crust formed over winter. The cultipacker seeder or a grain drill equipped for band-seeding are implements best suited for this job. Spring oats seeded at the rate of 1 bushel per acre and fertilized with 300 pounds of a 5-10-10 analysis or its equivalent is recommended as a companion crop particularly on the steeper land subject to erosion. These oats should be removed in early summer, preferably by grazing.

Unless reasonably well managed, a renovated pasture will revert to its former condition in a few years. Renovated areas should be fenced and only lightly grazed the first year to allow for proper establishment. Thereafter, rotational grazing, annual fertilization with 400 pounds per acre of 0-20-20 or its equivalent, and periodic clipping to remove weeds and unpalatable growth promote maximum yields.

Twice-a-day Exercise Good For Dairy Cows

Cows need exercise—even in the coldest weather. But that's only one of several good reasons for turning them out twice a day says Jim Crowley, Wisconsin dairy cattle specialist.

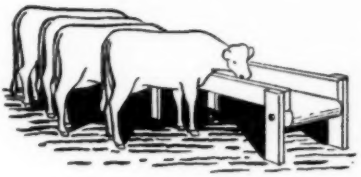
For one thing, outdoors is the best place to detect cows in heat. And it's easy to overlook a cow during the 14 to 16 hour heat period if she's just turned out once a day, Crowley explains. Then, cows getting exercise will eat more hay. This means your grain bill will go down if you keep the hay rack in the barnyard filled.

When is the best time to turn cows out? Crowley says you can work out your own schedule. But while you're cleaning the barn in the morning, and just before evening milking, might be as good times as any.

You can leave the herd out as long as you want, Crowley says. They can stand the cold. But it's a good idea to protect them from icy winds with a tree or board fence windbreak, or keep them on the south side of the barn. Young stock need lots of outdoor life, too. On clear days they'll absorb Vitamin D from the sun, and the exercise does them good.

Wisconsin Extension

How to Ration Protein With Salt



Loose salt with meal-grain mixtures proves excellent for holding consumption to the daily needs of cattle. . .

Condensed from Agricultural Research

AN increasing number of southwestern cattle are taking their oil meal with considerably more than a grain of salt these days.

That's because an increasing number of cattlemen are adding loose salt—as much as 50-50, in some cases — to regulate the amount of self-fed protein supplement that cattle consume. This way, supplements can be put out weekly instead of daily.

For some years the practice has been followed by scattered cattlemen on a trial-and-error basis. Demand for better information led to research at the Southern Great Plains Field Station at Woodward, Okla.

Considerable information has been gathered, with the cooperation of the Oklahoma experiment station, Salt Producers Association, Carey Salt Co., cattlemen, and others.

The scientists found that loose salt, with cottonseed meal or meal-grain mixtures, holds daily consumption to the desired level. "The animals simply stop eating when they have consumed all the salt they can assimilate each day."

This keeps animals from overeating protein, and excess salt passes through quickly with no ill effects. Larger, more vigorous animals move on to other grazing after eating their fill, leaving plenty for smaller, weaker, or more timid animals.

The research showed that the required proportion of salt to meal varied with age and weight of animals, quantity and quality of range forage available, length of feeding period, and the amount of meal intended for daily consumption. Scientists believe it generally advisable to separate a herd into reasonably

Reprinted from Agricultural Research, Washington, D. C.

uniform weight groups, to get uniform consumption of meal.

Quantities of salt for different weight classes of steers had to be increased slightly during the winter, when the animals developed a greater tolerance for salt. Similar results were obtained with breeding cows. Less salt was required in summer.

Scientists also noted that the better and more plentiful the range forage, the less salt was required for a given rate of meal consumption.

Average winter gains of weaner steers self-fed the salt-meal mixture were 14 pounds less than gains of comparable cattle hand-fed equivalent amounts of protein in pellet form. But a similar experiment with yearling steers showed no significant reduction in summer gains.

The drop in winter gains, scientists suggest, was probably due in part to the extra energy required by the salt-fed cattle, which drank twice as much cold water as meal-fed cattle.

Restricted feeding space also may have been involved in the drop. Scientists advise stockmen adopting this feeding practice to provide enough bunk space so that half the cattle, or more, can eat at one time.

After having been on range supplement of salt and meal for 150 days during the preceding winter and for 90 days in late summer, cattle showed no difference in feedlot gains when compared with similar cattle that had been pellet fed on the range.

There are fewer advantages in the salt-meal method over daily hand feeding when cattle are fed on conveniently located small pastures.

But the method can aid a range feeder. Along with advantages mentioned, a salt-meal mixture helps train calves to eat supplements. And bunks can be placed long distances from water to encourage animals to graze over the range.

Care Can Cut Market Losses

Farm marketing losses are staggering. Market specialists of the U.S. Department of Agriculture report about one-fourth the value of lettuce, onions, and peppers and about one-fifth the sweetpotatoes, celery, and tomatoes are lost in marketing. One-fourth the value of strawberries shipped to market is lost and one-fifth the value of apples. Losses also range high in the processing of fruits. Of course, farmers can't control many of these losses. But the specialists say some of the losses could be cut by more care in gathering, prompt delivery of the crop, and better preparation for shipment. *New Mexico Extension*

Dehorning Calves, A Safe, Easy Method

The "hot iron" method has many advantages for the dairyman and stockman. . .

Condensed from Western Dairy Journal

W. R. Van Sant, Arizona Dairy Specialist

MANY dairymen do not like to dehorn their cattle because they believe it adds to the appearance of the animals to have horns. Others don't like horns but never seem to have the time to get the job done.

Every owner of cattle that allows the horns to grow has numerous injuries to the udder. Any injury is costly in a producing herd.

In the interest of efficient and high production, through reduced injuries, there is no room for horns in the dairy herd. This all adds up to the fact that horns should be removed. The best time to dehorn is when they are small because it is easier, cheaper, and you are much more assured of a good, smooth job. In addition, there is less chance of infection and other complications as a result of the removal.

Hot Iron Method

There are numerous methods of removing horns. I want to discuss the "hot iron" method which isn't new, but has never been used extensively. It is a simple, easy, bloodless method. It can be done with an electric dehorner. Several commercially manufactured ones are now on the market which are somewhat like a soldering iron with a special tip having a hollow point. The requirement of the iron is that you can move from one calf to the next rapidly without waiting long for it to heat up again.

Some dairy breeds grow horns faster than others, but in general the best time to dehorn is from three to ten weeks of age. Horns can be successfully taken off as long as they have not grown fast to the skull, if you have irons with sufficient large "bells."

The principle of the hot iron consists of killing the growth of horn producing tissue at the

Reprinted by permission from Western Dairy Journal, Los Angeles 58, California, December 1954

base of the horn, as well as destroying the blood circulation to the horn. Upon killing the growth tissue the horn buttons will drop off in three to six weeks leaving a clean head which "hairs over" readily.

Watch for Ring

The calf should be placed in a position so you have complete control of his head. This can be done in the stanchion or you may want to lay it down with the feet tied, which makes the job very easy. Allow the iron to get hot, apply the iron over the horn button with an even pressure and rotate for 20 to 30 seconds. This is usually sufficient to produce a copper-colored ring close to the base of the horn. This should be evenly colored all the way round.

There apparently is no detrimental effect to the calf and it will be back eating in a few minutes after the job is finished.

The most important thing to insure no slips is to be sure the burning is thorough, and even all around the base of the horn.

Bred-To-Lay Chicks Will Pay This Year

With the predicted tighter squeeze between high feed prices and low egg prices in 1955, the bred-to-lay chicks will be the ones that will return a profit to the producer, Thomas B. Morris, an extension poultry specialist, says.

As an example he suggests looking at the records of two producers, he calls "Farmer A", and "Farmer B". Each started with 650 pullet chicks, averaged keeping 500 hens for the year. Also each one averaged paying five cents a pound for feed and received 50 cents a dozen for the eggs sold.

"Farmer A" paid 28 cents per chick and raised 600 pullets at a total cost of $3,377. His hens averaged laying 155 eggs per bird and brought him $3,229 for eggs. His culled pullets and hens sold for $500, leaving him a labor return of $402.

It's a different story for "Farmer B" who bought bred-to-lay chicks. True he paid 35 cents each for his chicks and his feed bill was higher. But his hens averaged 240 eggs during the year. "B's" egg income amounted to $5,000 and his culled pullets brought $550 for a total income of $5,550. After deducting expenses he had a labor return of $1,752.50.

Morris points out that the farmer who bought the cheap chicks realized a labor return of around 80 cents per bird, while his counterpart who invested a few cents more for well-bred chicks received $3.50 per chicken.

Extension Service

One Square Foot of Floor per Pullet

Recent poultry housing research at Pennsylvania State challenges standard space recommendations. . .

Condensed from Poultry Tribune

Glenn O. Bressler

HOW much floor space should be allowed per pullet?

For many years, the accepted recommendation has been three to four square feet per layer.

What has been the basis for this recommendation? Probably most of you will agree that it has been experience. Pullets housed with less floor space presented a lot of problems. Litter became wet and eggs dirtier. The air became stronger with ammonia because of inadequate ventilation. Possibly, there was more cannibalism. Finally, egg production may have been lowered and the general health of the flock impaired. These have been good reasons for poultrymen to stick by the standard recommendation of three square feet per layer.

Research workers at Pennsylvania State University after careful study have felt that inadequate housing was the basic cause of these management problems. Results in a 30 x 100 ft. experimental solar laying house, designed and constructed to study these housing problems, substantiate this belief.

Comfortable Housing Under Crowded Conditions

In the solar house, litter can be kept dry and eggs clean. The air remains fresh and free from ammonia, and a fairly uniform temperature well above freezing can be maintained during cold winter nights. All of these conditions have prevailed in spite of housing twice the usual number of layers in the given floor space.

Pullet performance under these crowded conditions, although not ranking with the best of commercial flocks, which are allowed three square feet

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per pullet, has been very satisfactory.

It has raised the question as to which is most important from a profit standpoint, a high rate of lay with a lower volume of eggs from a given house or a somewhat lower rate of lay with a much higher volume of eggs because of the larger number of layers. Results so far would indicate that rate of lay may be partially sacrificed for volume. Further investigation is being made at the present time.

Layer comfort provided in the solar laying house may lessen the amount of floor space required per pullet. This possibility is revealed in results obtained in experimental work thus far. In 1952-53, a flock of 1,508 leghorn pullets housed at a rate of 1.9 square feet of actual floor space per pullet averaged about 50 percent egg production on a pullet housed basis during an 11-month period. Mortality was about 15 percent and an additional 32 percent of the flock was culled during the period.

To obtain further information relative to the effect of crowding upon layer performance, a flock of 2,134 leghorn pullets was housed last fall at the rate of 1.3 square feet floor space per pullet. The performance during eight months of lay was just as satisfactory as the 1952-53 trial in spite of the crowding. The flock averaged 50 percent rate of lay, 8 percent mortality, and 10 percent culling.

Further crowding will be continued until a definite break in flock performance becomes evident. Last fall about 2,800 pullets, allowing roughly one square foot of actual floor space per pullet, were housed.

At the close of each trial, the profitableness of the flock will be determined and related to rate of lay and volume of eggs produced in the house. With this information it should be possible to arrive at a new recommendation for floor space per pullet. There is ample evidence considering all factors, that in a solar house the long standing recommendation of three square feet of floor space per pullet can be sharply reduced.

In spite of the crowded conditions in the solar laying house, litter has remained dust dry all winter long and eggs have been up to 92 percent clean, averaging better than 80 percent. There is positive drying action in the solar house which eliminates wet litter and provides bird comfort.

Ventilation Needed for Comfort

To provide the comfortable environment in the solar laying house required a combination of insulation, a positive means of air movement, and frequent

mechanical removal of a large volume of droppings from pits.

The problems in ventilating conventional poultry houses have been excessive moisture, lack of heat, and lack of positive means of air movement. Heat is required to evaporate litter moisture before it can be removed by ventilation.

Layers, in the numbers ordinarily housed, provide a relatively small quantity of heat compared with the amount needed. Measures must, therefore, be taken to conserve as much of the animal heat as possible and in addition utilize the heat energy from the sun. This requirement was met by insulating the walls and ceiling.

A wide band of fixed insulated windows oriented to the south admits a maximum amount of solar heat during fall and winter seasons. These windows are shaded in the summer for coolness. By crowding layers, the amount of animal heat was increased.

The combination of additional animal heat and a larger than usual amount of solar energy admitted through the vast window exposure to the south has provided the necessary heat to evaporate moisture and permit fans to operate effectively.

Eight pressurized inlet fans force air into the house at a rate of about 5,600 cubic feet per minute or an air change every 4 to 5 minutes. Foul air leaves through special openings and cracks around doors. A thermostat set at 50 degrees F. controls the operation of the fans. At no time during the past winter did house temperatures fall below the 50 degrees F.

Pit Cleaner Removes Moisture

The arrangement of feeders, waterers, and roosts over pits cleaned mechanically is another extremely important feature of the house. About 1,200 pounds of droppings are collected and removed from the house every other day. Since droppings average about 75 percent moisture, roughly 900 pounds water are being removed mechanically. This is a substantial reduction of the moisture load which ordinarily would have to be removed by a ventilating system.

Results of research are too incomplete to predict how much one can profitably invest in better poultry housing. Housing two or possibly three times the usual number of layers in a given floor area, without seriously impairing egg production, livability, or the general health of the flock would justify a much higher investment than is considered sound under present housing conditions.

If we consider under present day conditions $5 per layer a sound investment in housing, then the cost of a house for

1,000 layers could be $5,000. If we built a better poultry house of the same size with features similar to the solar laying house, able to accommodate satisfactorily at least 2,000 layers, then $10,000 could be invested and the investment per layer would remain at $5.

The additional advantages of improved housing comfort, cleaner eggs, and increased labor efficiency would add further to the justification for better poultry laying houses.

Milk Replacing Wine in Sunny Italy

According to Dairy Record, the wine industry in Italy is going through its gravest hour because Italians are drinking milk instead of wine. It appears that they discovered milk only after the U.S. Army had brought thousands of GI's into the country and the Italian girls were impressed by the physiques, energy, and healthful appearance of the Americans.

Danger of Soil Compaction Cited

Soil compaction someday may rank with erosion as a factor limiting crop production, says Jack H. Barton, Texas soil and water conservationist.

Land used for intensive cultivation and grazing is in greatest danger. Compaction of the soil begins to limit crop production when the soil particles are pushed together so closely the movement of air and water through the soil is restricted. Plant roots upon reaching the compacted layer—or hard pan—begin to grow in a lateral direction.

Soil compaction is often associated with clay and clay loam soils. The conservationist says they also form in sandy and medium organic type soils. "Best remedy for this condition is to work with nature and not against her," says Barton. He urges farmers to simplify tillage operations to decrease the number of trips over a field with heavy equipment. Avoid working or grazing fields that are too wet.

A good rotation system will increase the organic content of the soil. Well-fertilized, deep rooted crops will help crack the hard pan, Barton says. A compacted soil holds less water and is more subject to erosion than a soil without this hard layer, he says.

Texas A.&M.

WHO GETS THE PROPERTY?

Many things must be taken into consideration when you make a will . . .

Condensed from The Michigan Farmer

Raleigh Barlowe, Michigan State College

TALK about property inheritance and almost everyone perks up his ears.

Property owners wonder how they might best handle their estates; prospective heirs wonder how they will make out; even neutral bystanders are interested in who will get what and when. From almost every angle, inheritance makes an interesting subject.

Most people agree that the problem of how property is transferred and who receives it, deserves careful consideration. But, unfortunately, this subject is not one that we discuss freely around the breakfast table.

So long as parents are not under pressure, they ordinarily prefer to leave their plans fluid and unjelled so that they can be adjusted to changing situations. As a result most property owners tend to postpone their decisions relative to inheritance arrangements. Even when they have made definite plans they frequently hesitate to discuss the details of these plans with their prospective heirs.

Children and other heirs, on the other hand, are usually just as hesitant in asking questions about the details of future inheritance arrangements. Rather than give the appearance of being grabby, many prospective heirs seem content to operate on faith and hope with no definite assurances concerning their future position as heirs. This atmosphere of uncertainty is sometimes sobering and wholesome. But just as often—and particularly when one of the prospec-

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tive heirs has undertaken the job of operating the home farm while helping to look after his parents—this situation may involve injustice and present a barrier to the efficient management and operation of a farm.

Wills Need More Attention

Generally speaking, most farm families should give more attention to the question of inheritance arrangements. Many a family quarrel could be avoided if parents would discuss this problem with their children and help them come to a mutual agreement concerning the shares each heir should expect.

In the development of better farm inheritance arrangements, emphasis might well be placed upon ways and means for attaining the following goals:

1. Minimizing cost, time, and trouble in estate settlement..
2. Keeping the farm as an operating unit.
3. Safeguarding the security of the parents.
4. Securing fair treatment of heirs.

Most families want to hold their property inheritance costs to a minimum. At the same time they want to avoid time-consuming delays in estate settlements and they would prefer to forestall misunderstandings and quarrels between heirs. Sometimes these objectives cannot be planned too well in advance. But they ought to be considered in working out a property inheritance arrangement.

From the standpoint of heirs, the local community, and the nation-at-large, it is usually desirable to discourage the breaking-up of economic operating units. When these units are broken up or when their normal operation is disrupted by division of the farm, separation of the cropland from the buildings, or separate disposal of the livestock or machinery, the farm loses much of its current value as a going concern. This situation may be temporary but it is both costly and wasteful.

Good reasons sometime exist for breaking-up farm holdings, particularly large farms or farms that involve more than one unit. However, unless the property owner has excellent reasons for the physical division of his holdings, he should attempt to work out an inheritance arrangement that will permit the complete economic unit to pass on as a going concern. The entire inheritance need not go to one person. Joint ownership arrangements may be considered; some heirs may receive cash or other properties; or arrangements may be worked out to have the recipient of the farm pay off the interests of the other heirs over a suitable period of time.

Property owners who work out inheritance arrangements

usually give considerable attention to the welfare and well-being of their prospective heirs. But they must also consider their own future welfare. Were this not the case, they would often find it desirable to make outright gift to their heirs rather than delay the transfer of their property until the time of their death.

Give Chance to Manage

There are many arguments for giving children and other heirs property and other working capital, plus the responsibility of managing their own property, fairly soon after they have reached the age at which they can start out for themselves. Heirs who receive their inheritance early in life often find it possible to put their resources to productive use. This opportunity naturally is not available to those who wait until they are well along in years before they receive this help.

Parents who recognize this ordinarily provide their children with various amounts of help in getting started. Frequently they work out intra-family farm transfer arrangements to permit a son or other heir to take over operation of the home farm while he is still in his physical prime. But parents ought to consider their own future welfare. Before they transfer their property they should consider the probable effect of their actions should they outlive their children. Other problems may arise in the case of financial setbacks, high medical expenses, or depressed business conditions.

As a final goal, serious consideration should be given to the equitable treatment of heirs. Our inheritance laws favor equal treatment of heirs. Equal treatment, however, often involves inequitable treatment. Almost every community has cases of sons or daughters who have operated the home farm for their parents or who have cared for their parents during their declining years while their brothers and sisters have been free from this responsibility. In cases of this type, it is only fair that the heirs who have stayed at home or those that have cared for their parents should receive special consideration.

When some of the heirs have received special financial help for their education, for the launching of their businesses, or for other purposes, these grants also should be considered in the determination of what is and what is not equitable treatment.

U.S. Dairymen produced nine million pounds of milk last October, slightly more than a year earlier and the most for the month in 25 years of records.

How Good Are Grazing Alfalfas?

Several promising varieties are being developed. . .

Condensed from The Utah Farmer

Gene McNulty

WHEN a fenced pasture or piece of open range has been raw-hided by overgrazing to the point that it is almost worthless for livestock, two courses of action are open: (1) Cut stock numbers down in proportion to the feed available, or next to nothing; or (2) do something about making that land produce more.

E. R. Jackman, widely respected grass specialist at Oregon State college, has for many years been advocating more attention to the second method. Where a range isn't too badly beaten up, lessened grazing pressure sometimes will do wonders in bringing it back, but that doesn't mean, he argues, that the logical other approach should not be used, too.

Jackman, and other range management men, long have realized that nature somehow slipped up in not providing a palatable native legume that would thrive out on the open range, especially in our low rainfall, desert areas. Improved grasses and legumes have produced astounding amounts of beef and milk per acre under cultivation, but not as much progress has been made in bringing up the feed production of vast areas of low rainfall range lands. Lack of a suitable protein-contributing legume has been one drawback.

Nearly five years ago, Jackman wrote an article, "Pity the Pasture Planners!" in which he made the following statement:

"We have no legume for the desert soils and no legume for the eastern Oregon forests. These two types make up more than half the land area of the state. Most desert legumes are either unbearably bitter, or poisonous, or both. Won't someone

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please find some truly dryland legumes?"

Farmers and ranchers then didn't realize that there were "grazing alfalfas." Apparently Jackman didn't either, but a year or two later when he heard that the Burlingham and Sons Seed company of Forest Grove, Ore., had put a former county agent, Bill Cyrus, to work developing a tough strain of alfalfa found in southern Oregon, Jackman's mind came to a point, like a bird dog. His technical nose has been aquiver ever after.

Much has been reported since then about this new alfalfa, Nomad, and others with similar characteristics. Jackman's name has been attached to a good many optimist quotations, but he hasn't gone so far as to say, "This is it, boys, we've got it!" He is too wise an old head to get himself out on a limb until he is sure.

He now has 75 grazing alfalfa trials set up under all kinds of conditions in eastern Oregon. These plots should give the best answer yet as to whether Jackman's prayers for a legume tough enough to take it on low rainfall ranges have been answered. He's still optimistic—more so, perhaps, than any range management specialist in the country—but waiting for more field trial evidence before he puts himself on record with a final appraisal.

Few of the 75 field plots he is watching so closely are less than 30 acres in size, and all are planned on a practical grazing basis. Five alfalfa varieties are on survival test in each one: Ladak, Nomad, Ranger, Sevelra and Rhizoma.

"We want the pasture trials grazed and we want to see which alfalfas will persist," explained Jackman. Getting the legume that will persist for years on the range in areas of scant rainfall is even more important to Jackman than the total forage yield.

Jackman points out that wild alfalfas survived centuries of grazing abuse in the Biblical countries of Asia. He's sure that the right alfalfa will persist when planted on the ranges of the west.

He's just as certain that too much talk about overgrazing has held up the improvement of western ranges.

Around 60 of the Oregon grazing trials were 1953 plantings and the balance were drilled last spring. Not enough grazing seasons have elapsed to justify survival conclusions, but Jackman gives a hint of what can be expected under adverse, drought site conditions. Only Ladak and Nomad have survived the 35-acre planting on the Ed Hoeft ranch at Pilot Rock, Ore. Here the alfalfas were planted on a tough hilltop site. The gravelly, shallow soil

retains but little moisture during the grazing season.

Deer and rabbit foraging often can compete with livestock when alfalfa is planted on the open range. Avon Derrick, Fort Rock, Ore., has had plenty of trouble with both deer and rabbits. On the trial plot on his ranch, only Nomad survived the wildlife grazing competition.

Until recently Ladak has been recommended as the best range alfalfa. Ladak quickly sinks its roots down into the soil and its ability to go dormant during dry weather periods has had much to do with its survival. But now Ladak is closely contested by Nomad.

Tough Nomad was discovered in Oregon's Klamath county. There it is known to have survived 26 years of annual plowing and cropping. This discovery field was in an area of but 11 inches annual precipitation and growing at over 4000 feet altitude. Bill Cyrus, Burlingham agronomist, selected parent plants from this discovery field on the basis of persistency, forage production, type of crown, drought resistance and leafiness.

What accounts for Nomad's ability to persist under rugged grazing conditions? The answer must take into account the unusual characteristics of the plant.

While other alfalfas branch out from the crown, Nomad puts out new growth from root growth shoots. This ability puts the alfalfa in the class of a rhizome plant, and the older the plant the more spreading is the crown growth, since new root shoots mean more surface foliage every year.

Both Jackman and Cyrus report that grazing helps develop even more root spread and accordingly this means more crown spread.

Naturally, like any other crop, Nomad needs to establish itself before being grazed. The entire plant must at first grow if its roots are to grow. Under tough soil and moisture conditions, don't expect much rhizome growth until the second or third year. Rhizomes are under the ground—not on top, and the only way to actually see the rhizome and crown development is to dig up a few plants.

Another unusual and valued characteristic is its ability to form a new crown when the old one is cut, or broken off, by cultivation or eaten off by gophers. This oddity enables the plant to survive rodent injury that may kill other legumes.

Commenting on a five-year-old planting in Morrow county, Oregon, Jackman had the following praise for Nomad: "At this place grazing alfalfa was planted adjacent to the buildings in a little swale that was moist most of the time.

"Pasturing had been rather intensive but the alfalfa had spread, making a solid stand with a perfect mass of interlocking roots. This is the best example I have seen in the state of the possibilities of Nomad alfalfa as it is evident that gophers, livestock grazing or nothing else have been able to affect the stand up to now."

While grazing alfalfas are finding a home on the range, sizable plantings are going in also on diverted wheat areas. Paul Webb, Hepner, Oregon, seeded 95 acres last spring. Cooperating in the OSC grazing trials, he is trying all five alfalfa varieties. For the alternate grass rows he used intermediate wheat grass and alta fescue.

All alfalfas are off to an excellent start on the Webb planting. The high country planting is on land adjacent to the Blue mountains and rainfall is ample.

Following a ranch planting drilled in cheatgrass and sagebrush cover, Ed McCanse, North Powder, Ore., reports: "We figured up the probable but conservative amount of dry feed on the Nomad-grass field. We should easily make 100 pounds of beef per acre, based on animal days grazing per acre.

"The Nomad is persisting in competition with the native forage and every plant we dug around showed its creeper characteristics. I'm very anxious to try Nomad on a fairly large scale on all the pasture land I can get over with a grain drill in the spring."

McCanse sent this report to Cyrus in December. Last spring he followed through with his "fairly large scale" pasture planting. He drilled 600 acres of native range to Nomad and crested wheatgrass.

That added dividend of more feed for the range by adding a pound or two of alfalfa to grass seedings has been carefully checked by the Intermountain forest and range experiment station at Ogden. An alfalfa-grass mixture yielded 8000 pounds per acre, green weight, while pure stands of grass (intermediate wheat, tall wheat and smooth brome) yielded from 2800 to 5300 pounds. This was from a 5-year-old broadcast planting of Ladak with a mixture of grasses and in a mountain brush area.

In another trial the forest service compared nine strains of so-called creeping or grazing alfalfas with the taproot types. With the standard alfalfas the gophers tended to eat off the taproots and the plants died. But in the case of the true grazing types many of the plants that were eaten off lived.

Grasses to be used with the grazing alfalfas will depend upon the area, soils and annual moisture. Crested wheatgrass is sug-

gested for drier areas. Smooth brome, intermediate wheat grass, orchard, alta fescue and other varieties fit in, depending upon the locality and soil and moisture conditions.

Range preparation in the fall and drilling in the following spring is an ideal in planning for more forage. Sagebrush should be cleared and cheatgrass stands should be broken up by disking and harrowing. The alternate row planting is an early spring job and the rancher will want to plant before winter moisture has been lost.

The alfalfa seed must be in the soil—not on top. Seeding nearly as shallow as the seed can be put into moist soil is desirable. A one-inch depth is fine but two inches usually is too deep.

Turning from the range to the west coast region, Rhizoma holds promise as a fine grazing alfalfa. Developed by the University of British Columbia, Rhizoma has more seedling vigor than has Nomad. Where planted on western Oregon farms, Rhizoma looks good, Jackman says, and his impression carries through with the experiment station trials at Corvallis. The alfalfa is also rated fine as a hay yielder.

Be sure and buy certified seed regardless of the grazing alfalfa you believe best suited for your needs. The certified tag is the sure guarantee that you are getting the variety wanted.

Carbamate Sprays Thin Peaches

Certain carbamate spray materials have shown promise for thinning peaches in tests at Virginia Agricultural Experiment Station. Horticulturists there say the tests indicate that a satisfactory spray may now be developed which will reduce the cost and improve the effectiveness of the peach-thinning job. Materials used in the past for thinning apples have not given very satisfactory results with peaches.

The horticulturists also report that the use of ground sprays to control pine mice seems to be one of the most promising developments in the field of apple production.

A spray of endrin applied to the ground in an apple orchard at the rate of about 2½ pounds per acre has given complete control of mice in several tests. Commercial growers are now starting to use endrin, and find it far more effective than poisonous baits. Damage to fruit trees by pine mice is one of the greatest hazards confronting Virginia orchardists.

Virginia Extension

High Breeding Efficiency: Gateway to Higher Profits

How one dairyman gets 81% conception at first service. . .

Condensed from The Ohio Farmer

Olen V. Mann

FEW dairymen can claim 81 per cent non-returns on first breeding services. But William Akerholm, who farms near Jefferson in Ashtabula County, Ohio has made this kind of record. And he's done it over a six-year period. Bill had a total of 108 first services and only 20 times did Technician Jim Case have to return for extra services.

Sixty per cent non-returns on first services is considered good breeding efficiency. But for the dairyman who can get even better results, the gate is open to higher dairy profits.

Let's take a look at the secret to the high breeding efficiency in the Bill Akerholm Holstein herd. Bill got his start in the dairy business back in 1914. He owns a 126-acre farm and maintains a milking herd of 26 head. All but two cows in the herd are products of artificial breeding.

After a talk with Bill about his dairy herd, there are several things that stand out as reasons for his success. He's a good cowman right down the line and a good feeder. Cows on this farm get a 12 to 16 per cent ration. His cows also get all the hay they can eat plus one-half bushel of silage twice a day. Grain is fed in proportion to milk production. Bill sees that his dry cows get some grain, too.

This Holstein herd is in excellent health. Good proof is the small amount spent each year for veterinary services. Some years it doesn't amount to more than $10.

Cows in milk get mixed hay composed of two-thirds clover and one-third timothy. They also graze premanent pasture composed of Dutch white clover

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and bluegrass. Bill's rotation pasture is a Ladino-red clover-timothy mixture.

Milk cows are not the whole show on the Akerholm farm. Bill makes an extra effort to see that his calves get a good start. For the first two weeks, calves get nothing but whole milk. Then Bill puts them on part whole milk and part dried milk. When only a few days old, calves are taught to drink. They always get a warm drink. Akerholm thinks this is very important in raising calves.

When about four weeks of age, calves start getting ground grain. The amount they are fed is gradually increased. At about seven or eight months of age, the calves are given silage and all the hay they will eat. Bill gives all his cattle the same grain ration to save mixing more than one.

Heifers get good growth on this dairy farm. Bill doesn't want them to freshen before they are 27 or 28 months old. He says, "A heifer can't carry a calf and make good growth at the same time."

Bill maintains about a 10-month lactation period. Cows are dry for two months before they freshen. Then he likes to wait until the third heat period after freshening before having them bred.

A close watch is kept for cows coming in heat. Akerholm says: "No matter how healthy the cows or how good the technician, if you don't breed at the right time in the heat period your cows won't conceive. It's up to us to do our part and watch for them coming in heat."

If Bill notices a cow in heat at the evening milking, he phones Technician Case yet that night. If they are noticed first at the morning milking, he calls Case then. When called in the evening, the cows are bred the following forenoon. A morning phone call has the technician out that same afternoon.

This Ashtabula County dairyman likes to make things easy for his technician. A technician has a lot of cows to breed and the handier things are for him the better job he can do.

Many times when Case goes to the Akerholm farm, Bill is not there. However, Jim will find a check waiting in the barn record. On the check appears the name of the cow to be bred.

Akerholm's records show he is getting better conception than when he owned his own bull. He kept a Holstein sire on the farm for about 35 years—now he says he can't afford to have a bull.

Bill's good management has paid him well. It's giving excellent breeding results. His 81 per cent non-return record proves that. The improved type and production of his cows are bonus dividends.

THE FARM SHOP—A MONEY MAKER

A well-equipped farm shop will pay good dividends. . .

Condensed from Breeder's Gazette

Benson J. Lamp, Jr.

Dept. of Agricultural Engineering, Ohio State University

WHAT work can best be done in the farm shop? How much of an investment can a farmer justify in shop building and equipment? How much money can a farmer save by doing work in his own shop?

The farm shop helps to keep the machinery rolling and buildings standing and usable. First, every farm shop must be equipped to service completely machines and other equipment. Today's high speed machines need frequent lubrication and adjustment to maintain efficiency and maximum life. Buildings also need servicing if their potential life is to be realized.

Recently, a farmer had a $200 repair bill on his hay baler and 4 days loss of baling time because one zerk fitting had been missed for 2 baling seasons. Another farmer picked up a $50 repair bill because a bolt came out of the feeding fingers on a baler. The bolt had been loose some time before it came out. Many other examples could be given for machinery and buildings with servicing failure resulting in major repair jobs and costs. **Probably 90% of the total cost of repair work** could be eliminated if adequate servicing and operation were kept up.

Shop space and equipment may contribute to neglected servicing. A small grease gun that seems always to be empty or that pumps air may help the operator to miss that fitting. Lack of facilities for removing dirt from a machine may lead to missed grease fittings and loose bolts. Unremoved dirt will hasten rust and its resulting damage. No way to check

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air pressures, resulting in either hard or bulging tires, reduces tire life.

A well-equipped shop will help in obtaining adequate servicing, but in the final analysis, adequate servicing operation depends upon the experience, temperament, and thoroughness of the operator. The operator who maintains a reference library of operator's and servicing manuals in the shop and **who reads them,** who maintains lubrication records and time schedules, and who abides by servicing check sheets, will have minimum repair costs and lost time during harvesting.

Servicing is the first responsibility of any farm shop. Each hour of time spent in reading the operator's manual and inspecting and greasing a piece of farm equipment is worth at a minimum $10 per hour to the operator.

Now how about those costly repairs? Repair costs are of two types: (1) the direct type in dollars and cents showing cost of repairs and labor and (2) the indirect kind caused by delay in baling or other farm operation because of field failure. The delay results in reduced quality and yields. Frequently, the indirect type is many times more costly than the easy-to-see direct type. Adequate preseason planning and repair and proper servicing are the best insurances against field failures.

A shop investment in tools and building of 15 to 20% of the replacement cost of machinery and buildings is entirely justifiable from an economic standpoint. If the shop is properly used, the savings through reduced repair costs, reduced field delays, and higher trade-in values of farm equipment will pay for itself in 20 years (normally much sooner).

A major repair job completed by a farm equipment dealer would cost approximately 60% for repairs and 40% for labor. The 40% can be saved in the farm shop when the repair job is one not requiring skilled labor and when it can be done by the farmer when he shouldn't be doing something else. A farm equipment dealer must charge labor costs of $2.50 to $3.50 an hour from the time his mechanic leaves his store. The labor cost can oftentimes be substantially reduced by taking the machine to the dealer's place of business where repairs and tools are available and the mechanic's portal to portal time is eliminated.

Diagnosing engine trouble and repairing requires much greater skill than drawbar repairs. Likewise, completely repairing a mower is relatively simple compared to finding and

EXAMPLES OF SHOP USES

Type of Work	Machinery	Buildings & Utilities
SERVICING	1. lubrication 2. adjusting equipment 3. tightening loose bolts 4. freeing slip clutches 5. checking tire pressure 6. bolt & repair storage 7. sharpening knives	1. cleaning & painting 2. silo maintenance 3. cleaning down spouts 4. leaky faucets 5. paint & brush storage
REPAIRING	1. straightening and replacing broken parts 2. replacing mower ledger plates 3. valve and ring job on engines	1. repairing roofs & siding 2. replacing footers and floors 3. rebuilding fences 4. repairing lighting fixtures and wiring
NEW CONSTRUCTION	1. building hayrack 2. wagon running gear 3. adapting present machines and building new machines	1. building hog feeders and houses 2. constructing gates 3. feeding bunks 4. rewiring

CLASSIFICATION OF REPAIR WORK

Non-Skilled Labor and Regular Tools	Skilled Labor With Regular Tools	Skilled Labor With Special Tools
Mower repairs	Engine ignition repair	Magneto repairs
Plow repairs	Baler knotter repair	Hydraulic pump repairs
Disc harrow repairs	Baler plunger repair	Transmission repairs
Grain drill repairs	Carburetor repair	Differential repairs
Corn planter repairs	Crankshaft bearing repair	Valve and seat repairs
Manure spreader repairs	Governor repairs	Sleeve and piston replacement
Side delivery rake repairs		
Most combine repairs		Jobs involving the pulling of gears
Most corn picker repairs		

curing knotter trouble on a baler. Improper diagnosis of malfunctioning machines results in surprisingly high repair costs each year.

Just as great variations exist in the equipment required for doing various repair jobs. Valve refacing and reseating necessitate precision equipment costing in excess of $500, whereas broken chains can be repaired and replaced easily with a hammer, punch, and crescent wrench; total investment $6.00.

Investing in power tools should be restricted to those having frequent use if the investment is to be justified economically. For example, a three-tractor farm having the valves of each tractor reworked each

year, would have a total valve regrinding cost of $4.20 per year in the local machine shop. Valve equipment would not pay for itself in 117 years!

The farm shop is also a favorite place to construct small wooden structures such as hog pens and feed bunks.

No farmer, regardless of his talents, can afford to be without facilities for servicing his farm equipment program. His job is to keep the equipment in as good shape as when new by adequate lubrication, diligent inspection, and careful operation. Here is a good winter job. His servicing will be rewarded by few field delays, low repair costs, and high trade-in values. The well-planned and equipped farm shop has its place in every farm program and will pay its own way.

Writing in the Journal of the American Medical Association, Dr. W. H. Kaufman reports that many patients in Virginia have been eating alfalfa seed to cure arthritis, diabetes and other disorders, but instead induced skin eruptions, without relief from their diseases, which alfalfa seed will not cure.

Phenothiazine in Cattle Grub Control Offers Problems

Free-choice feeding of phenothiazine may someday help control cattle grubs but several problems must first be solved.

Main drawback to phenothiazine is its taste. Cattle do not like it and a practical way to feed the product has not been found.

Its future may hinge on whether research can "chocolate coat" phenothiazine and guarantee that animals on the farm will consume enough to produce a grub killing effect, says Dr. C. M. Patterson, Texas extension veterinarian.

In preliminary tests, a definite drop in the number of grubs was noted among cattle fed 2 grams of phenothiazine daily free-choice in protein supplement.

"With need for further testing, no recommendations are being made now," Dr. Patterson says. If phenothiazine should prove an effective grub-killer, it would be a significant step in the control of the costly parasites.

A recent report says meat packers are receiving more "grubby" cattle now than a year ago. In some cases, infested calves are running 10 percent above last year. Grubby calves usually sell $1 to $3 a hundred pounds less than those without grubs, Patterson adds.

Texas Extension

Birdsfoot Trefoil

No companion needed with this legume which is proving its value on many farms. . .

Condensed from Ohio Farm and Home Research

Myron A. Bachtell

A FOUR-YEAR test recently completed at the Agricultural Experiment Station at Woodster, Ohio indicates that birdsfoot trefoil does not need the help of Ladino clover to do an effective job of improving permanent pastures. Although trefoil is considered primarily a pasture legume, the crops in this test were harvested as hay. The method permitted the gathering of certain data which would have been more difficult to obtain if the crop had been harvested by pasturing.

To make the desired comparison, 4 pounds of trefoil seed per acre were bandseeded (A) alone, (C) with ½ pounds of ladino and (E) with 3 pounds of red clover seed. Timothy was sown uniformly on all plots. The bandseedings were made on May 6 in oats which was sown at the rate of 4 pecks per acre. Oat yields were mediocre but all legume stands were satisfactory. Following oat harvest the rainfall was slightly below normal. As a result, growth of red clover and ladino was rather slow and these legumes did not seriously retard trefoil development during the seeding year.

Since this test began there have been four seasons when first cutting yields were obtained but in only three of these years were second cutting yields obtained. Instead of taking an average of all these years it is more informative to study the behavior pattern over the four-year period.

In many cases at Wooster where legume-grass meadows are involved, the grass, at least after the first year, tends to grow so luxuriantly in late May and early June that the yield obtained in the first cutting is not a good measure of the behavior pattern of the legume. The second cutting which usually is low in grass content is more indicative of what is happening to the legume.

Reprinted by permission from Ohio Farm and Home Research, Wooster, Ohio

Birdsfoot trefoil has the reputation of being a slow starter. Ladino and red clover on the other hand are capable of making a rapid start especially with liberal rainfall. This test was designed to study the effects of seeding one or the other of these fast growing clovers with trefoil.

Red Clover Included

Inclusion of red clover with trefoil and timothy increased the yield of both first and second cuttings in 1950--the first year of harvest. But its inclusion led to decreases during the second and third seasons. Apparently the competition of red clover the first season gave the trefoil such a setback that the extra yield the first year was more than lost during the next two years when red clover no longer was present. But by 1953, after two years of diminishing influence of the red clover, the trefoil apparently had developed to the point where it was comparable to the trefoil sown alone. This is indicated by the fact that Seeding C had improved to the point where the second cutting yield was equal to that in Seeding. A.

The behavior pattern of ladino was somewhat different from that of red clover. During these four years the plots containing ladino had an outstanding early season appearance. The ladino was vigorous and the grass had the luxuriance which indicates a plentiful supply of nitrogen. At the June harvests the scales confirmed the excellent yields on the trefoil-ladino plots. But in 1953— the fourth year—the first cutting from Seeding C, a trefoil-ladino mixture, showed no superiority over Seeding A which was trefoil alone.

For the second cuttings, ladino apparently contributed a slight decrease the second year. Yields for the third year were not taken but in 1953 the second cutting yield was decidedly lower where the seeding included ladino. This cutting represented the growth between June 4 and July 23, a period which was drier than normal. June rainfall totalled only 1.87 inches and that in July up to the time of the second cutting was 1.53 inches. The small yield on the ladino-trefoil plot probably reflects not only the low drouth resistance of ladino but also the partial suppression of the trefoil which does have the ability to make considerable growth in dry weather.

Many Pastures Not Suited

The introduction of a legume into permanent pastures should provide for a long-time legume-grass association. Many pastures, for one reason or another are not suitable for frequent plowing and reseeding. Ladino is

Yield of Legume-Timothy Mixtures

Legumes seedings made with timothy	Yield of Hay—First Cutting			
	1950	1951	1952	1953
	Lb.	Lb.	Lb.	Lb.
A. Birdsfoot trefoil	4900	5940	5600	5270
C. Birdsfoot trefoil plus ladino	5030	6900	6320	5160
E. Birdsfoot trefoil plus red clover	5390	5500	4600	5120
	Yield of Hay—Second Cutting			
A. Birdsfoot trefoil	2170	2800		1140
C. Birdsfoot trefoil plus ladino	2360	2600		360
E. Birdsfoot trefoil plus red clover	3070	2000		1120

valuable as long as it can be retained in blue-grass but it is well known that this is not easily accomplished. Extremely early clipping and proper fertilization with phosphoric acid and potash are valuable aids but it is no certain guarantee that this large-growing white clover will stay and perform its proper function. Moreover, its low reliability in dry summers is discouraging.

Birdsfoot trefoil, on the other hand has the qualities that give it permanence, high yield and reliability. One pasture at the Experiment Station now in its tenth year is as productive as ever. Trefoil continues to grow even in the lower areas which are distinctly marked by clumps of wet land grass. Cases are on record where trefoil stands have persisted for 2 or 3 times the 10-year span of the Experiment Station pasture. Thus this legume offers promise that one seeding may be all that is required for an entire lifetime of farming.

With this long look ahead, nothing should be done to interfere with the possibility of a successful seeding. In this experiment the seeding was made in a rather dry year and the suppression of trefoil by red clover was minor and limited to a couple of years. But in case the seeding should coincide with a wet season which is very favorable to red clover, the injurious effect on the trefoil might be disastrous. So it can be said with a great deal of emphasis that red clover should not be sown with birdsfoot trefoil in pasture renovation.

The statement regarding the inclusion of ladino clover cannot be so emphatic. After all, in this single Wooster test the combination of Ladino and trefoil led in total yield for the first two or three years. But then

the small summer growth of the fourth year reflected a weakness which is likely to persist in future years. So the inclusion of ladino is one of those doubtful things which may be good but which also may be bad from the standpoint of suppressing the trefoil. This is especially true if it is sown in a wet season. If one believes the old adage, "when in doubt, don't do it," ladino will be omitted and efforts concentrated on obtaining a satisfactory stand of trefoil.

Including birdsfoot trefoil in bluegrass pastures improves them, but dairy farmers still will have need for additional summer pasture from rotation meadows that contain alfalfa. Trefoil continues green longer into the summer than ladino but its summer recovery after pasturing is markedly inferior to that of alfalfa. The bluegrass part of the combination makes its most luxuriant growth during the spring season and enters the summer period in various stages of maturity. Because dairy cows do best on immature high protein pasture, it is not wise to have so large an acreage of trefoil-bluegrass that the lush spring growth of bluegrass cannot be well controlled by pasturing and clipping. This somewhat limited acreage is entirely too small to furnish adequate pasture from the trefoil during the summer period when bluegrass is at its poorest.

For beef cattle there is less need to maintain highly succulent, immature forage throughout the season. Consequently, the acreage of trefoil-bluegrass needs no particular restriction where this class of livestock is concerned.

Due to its deep root system which reaches into the subsoil, birdsfoot trefoil may continue for a while to produce fairly well even though the top soil receives a relatively inferior pasture treatment. But like other legumes it responds to limestone applications that raise the soil reaction to near neutrality and to fertilizer applications that prevent the available phosphoric acid and potash from declining to unproductive levels.

A new idea for weed control has been tested at Michigan State College. Newspapers and water were stirred in an old washing machine until a soupy mixture was made; this stuff was sprayed so as to leave a quarter-inch layer of pulp on the soil, and good control resulted, while rain penetrated and soil moisture was conserved. Some batches of the pulp had fertilizer added, and this soaked down. Very thin layers are being tested to control soil blowing on muck land.

VETERINARIAN'S NOTEBOOK NO. 13

Damage To Teats Can Cause Serious Damage

Some things to do and not to do. . .

Condensed from Farmer and Stock-Breeder

I don't suppose there is a part of the cow's body which is more liable to injury than the teats. For that matter, there are few parts to which injury can cause such serious consequences. You cannot treat a bruised, crushed or torn teat in the same way as you can treat a cut leg or a torn ear, and get away with it. You will end up with a three-quartered cow, and everyone knows what that means.

Teats can be damaged in a large variety of ways. Rough hand milking can do irreparable damage to the sensitive lining of the teat canal. Milking units which are left on too long or milking machines which are pulsating too quickly can have the same effect.

Then we have all seen the cow which has had a teat trodden on by the next cow in the barn, and last but by no means least, that dreadful mess which occurs when a cow tries to get over or through barbed wire.

Care Needed

The treatment of the first type of inquiry—that due to faulty milking technique "lies in your own hands" in more senses than one. These teats are sore, and a cow which is normally docile to milk becomes a "kicker" and won't let her milk down. It's just a matter of careful hand milking for a time until the inflammation dies down.

As regards the bruises and tears, my advice would be to get hold of your vet at once. The great risk from these injuries is mastitis in the quarter, to which the teat is attached, and that is a condition which is far better prevented than treated once it has arrived.

Don't go messing about with a badly crushed teat, soaking it in hot water, balming it up with ointments and even pushing

Reprinted by permission from Farmer and Stock-Breeder, London, England

things like pieces of straw or knitting needles up the teat to get the milk out and then wonder why the cow gets mastitis. I know you don't do that, but I can assure you that lots of people still do!

The same applies to tears caused by wire. If the tear has not penetrated the teat canal, then call at once, your vet can probably anesthetise the teat and stitch up the tear quite successfully.

Out of the Question

If you don't do anything for 24 hours, then stitching will, in all probability, be out of the question and you will be treating an open wound for 10 or 14 days, instead of having the whole business over and done with in about six days with any luck at all. In any case, don't smother the tear with ointment for there is nothing that attracts dust and disease-bearing flies more than that.

The type of tear which penetrates the teat canal and allows the milk to flow through the wound is in a class by itself. These are serious and little can be done while the cow is in milk because even if they are stitched, the milk tends to flow through the stitches. They are often left until the cow is dry and then an operation puts the teat in working order again ready for the next lactation. This is the type of injury which most often leads to mastitis, so you cannot be too careful in treating it.

Blocked teats offer another problem. Sometimes these blockages occur as a result of an injury. This applies especially to those blockages affecting the end of the teat. Sometimes they occur as a result of a previous bout of mastitis and sometimes they occur for no apparent reason at all!

There are several types of blockage. There is the membrane in some cases, which stretches across the top of the teat and stops the milk from entering the teat canal. These can usually be put right by a simple operation.

Then there is the "pea"—a small nodule of scar tissue which occurs anywhere in the teat canal. It is attached to the lining of the teat canal. Sometimes the milk comes and sometimes it doesn't. These are more difficult to get rid of and in some cases it is impossible.

Those stoppages at the end of the teat due to an injury again call for a small surgical operation. In some cases as a result of severe bruising, the end of the teat will heal over completely and it is necessary to make a new opening, so to speak.

Ask First

The best advice I have to offer about blocked teats is don't for heaven's sake go and push anything up the teat, not even

a teat siphon, without asking advice of your vet. If in spite of this you are determined to try using a siphon (you will probably do more harm than good) then do sterilize it by boiling before use and clean off the end of the teat with spirit before you insert it, otherwise you are just asking for an acute attack of mastitis and you will deserve it too.

The teat of the dairy cow is a most important organ. You cannot in many cases prevent injuries occurring to the teats, but you can prevent making the matter a thousand times worse by not fiddling about and delaying for 24 hours or so before having anything done by the man who really knows.

Farm Account Records Helpful to Farmers

Every farmer should keep a farm account record. A complete record of the farm receipts and farm expenses, together with inventory changes, furnishes the necessary figures for calculating labor income. Labor income is what a farmer gets for his year's work above interest on his investment and all farm expenses, in addition to having a house to live in and farm products to use in the home.

Records may also be useful in other ways, such as preparing income tax returns or furnishing valuable information in case of fire, the need for borrowing money, or in the settling of an estate.

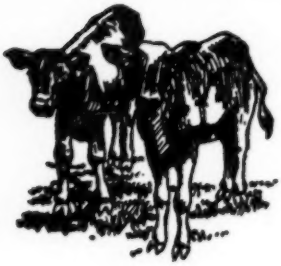
"Adequate farm records can be kept in simple form without a great deal of time being spent on them. A satisfactory record would include a property inventory, including feed and supplies, made at the beginning and end of the year, the numbers of livestock kept, a record of the crops grown and yields obtained, and a record of receipts and expenses together with the quantities of the different items bought and sold during the year.

With farming rapidly becoming more complex each year, it is necessary for farmers to know the facts rather than to guess about their business affairs. Your accounts for 1955 should be started as early in the year as possible.

Clemson College

External and internal parasites claim one farm animal out of each 20 and cost livestock producers about one billion dollars annually. Much of this loss could be stopped if producers would follow recommended parasite control practices.

ARTIFICIAL BREEDING, NATURAL OR BOTH?



A revealing breeding discussion valuable to every dairyman. . .

Condensed from the
Guernsey Breeders Journal

Dean V. A. Rice,
Dept. of Animal Husbandry, University of Massachusetts

THE greatest determining factor for the future of any breed of cattle is the bulls which are used to sire each succeeding generation of calves. This is not meant in any way to detract from the influence of dams. As everyone knows, any calf gets exactly one-half of its inheritance from each of its parents. But cows that leave any offspring in a herd leave on the average only about one or two because the great majority of cows are out of the herd for one reason or another before they are six or seven years old, and on the average, one-half of their calves are bulls. True, some cows leave eight, 10 or a dozen offspring and are the fountain head of great breeding families, but this kind is a rarity.

But while a cow is leaving one or two offspring, a bull may be leaving many, depending on the size of the herd he is used in. It is far from an oddity for more than half the cows in a herd to be the daughters of a single sire. That sire, too, may leave a son or two which come to be used in the herd, and thus his influence snowballs some more. With the wide and growing use of artificial breeding, sire influence on a breed reaches startling proportions. During 1953, some 4,845,222 dairy cows, or nearly one-fifth of the dairy cattle population of the United States, were bred artificially. There were 1,432 artificial breeding units in the United States and they were servicing 609,997 herds. Some of these bulls have had over 50,000 first services, and the average for all

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artificial bulls in 1953 was 1,925 first services.

We don't have the exact figures at hand, but we believe we can guess fairly accurately that the percentage of bull registrations in all registry offices has dropped from around 25 per cent to about 10 or 12 per cent during the past 10 or 15 years. This has happened in all the dairy breeds. The reason, of course, is obvious — artificial breeding. Up to 15 years ago, a slow, gradual evolution of better type and higher producing dairy cattle was in progress. It was slow—but it was steady. Artificial breeding has ushered in a revolution. It is still too early to properly appraise its effects. Its over-all effect so far has been to increase production in the average herd, because the artificial bulls available for use were better than the average dairyman was likely to find on his own. This is all to the good, provided the system does not have within it the seeds of its own dissolution.

The Good Old Days

Not so long ago, at least two and one-half times as many bulls were in use as in the case today. Every breeder and dairyman had at least one or two and the larger operators several. In short, a lot of bulls got a trial. Not too much was known about the correct way to pick young sires and many mistakes were made. However, the constructive breeders tried out lots of young bulls and kept them alive until the returns began to come in—knowledge of their daughters' type and production. Those which proved out best were then used extensively and for many years.

But the net result of all breeders' efforts added up to this. Some herds, with fortunate choices, showed marked improvement; other herds not so fortunate, retrogressed. Average cows were being bred to average bulls so far as the whole population was concerned, so the breed average increased very slowly. This was inevitable when so many bulls were used and where the method of their choice was, to say the least, superficial in terms of an understanding of their true inheritance levels.

What Goes Now

At present many fewer bulls are in use largely because of artificial insemination. The great question is whether these are actually the top bulls of the breed in their inheritance. If they are, the tempo of progress of the breed will be stepped up.

In the early days of artificial breeding, most bulls were picked on the basis of a comparison between their mates' production and their daughters' production. In short, on the basis of their index. To get an index, you have to put all the records,

mates and daughters, on a comparable level by means of age and of days and times milked, standardization factors. To some breeds, this was anathema—and still is – but you simply cannot compare apples and oranges fairly. Of course, it is not difficult to finagle in this regard. You can maltreat the mates and pamper the daughters and make a bull look good on paper—but you don't change the inheritance he will pass on to future daughters. These and many other shenanigans have been and probably are still being employed. They may gain a breeder some immediate cash—enough of them will wreck any breed. If the records are not honest—the index can't be.

How Have Proved Sires Done

On the average, proved sires have not lived up to their billing. Why? Because most of these bulls were proved in single herds. In some cases the bulls did better in the single herd as a result of the working out of a constructive breeding program in that herd—he nicked well there because of the breeding and selecting acumen of that particular breeder. Then, too, the feeding and management level in a constructive breeder's herd is generally far above that found in an average commercial dairy. So, say some, since the daughters of these proved sires did not do so well in Tom, Dick and Harry's herd, proved bulls are the bunk.

Well, wait a minute. In many states the artificially sired daughters of proved bulls are averaging over 400 pounds of butterfat on a 2x—305—mature basis. Perhaps that's not so bad when the general average of all cows (good and bad) is said to be about one-half of this amount. In general, the Proved Indexed Bulls which have been and are being used by Artificial Breeding Units have done and are doing a good job. In short, they had good inheritance and are passing it on to their offspring. There are, of course, individual exceptions to this statement.

Environmental Influences

During the past 20 years, the importance of environmental influences in determining the performance of animals has gradually come to the forefront in breeders' thinking. Until recently, most breeders have assumed (some erroneously still do) that all the variation in the performance of animals was due to inheritance. Anyone who has tried to improve livestock by breeding knows how far from automatic progress is. It is really not "too bad" that this is so because if 2 + 2 always made 4 in breeding, all the fun and excitement would thereby be removed.

There is an old adage in

breeding which said, "Half the breeding goes down the throat." This was a shorthand method of saying that environment and inheritance was equally responsible for animal performance. More recent analytical procedures, however, have revealed the fact that for most of the commercially valuable traits of our animals, about "75 per cent goes down the throat." In short, environment plays the major role in determining performance. It would be foolish indeed to jump to the wrong conclusion here and say—well breeding (inheritance) is not very important after all. That is not true. A cow with "scrub" inheritance cannot make 1000 pounds of butterfat a year no matter how well she is fed and cared for. If a cow has "elite" inheritance, then the proper feed and care will result in a 1000-pound record. Good inheritance does come first and is basic. The inheritance of the average cow in the United State is probably considerably above 210 pounds of fat a year. This average will move up beyond 210 pounds whenever we rid our cows of various diseases, feed them properly on good pasture, well-cured roughages and silages and suitable grain mixtures,

Why Animal Improvement Is Difficult

Animal improvement is difficult for two main reasons. One we have just discussed, namely, the blinding effects of environment. Here is a high record animal. Why? Good inheritance or good environment or both and how much of each? True, she had to have good inheritance before good environment could be effective. But no animal or man has the best environment continually. If everything broke right for a cow—long dry period, calved at best time of year, no complications at calving, was in the hands of an experienced and understanding herdsman, and so on, she will look better than she probably actually is. That's the reason a lifetime average is a much better guide in selection than is one favorable record. We need the records of several daughters to properly appraise a bull, and we need several records of a cow to properly appraise her probable genetic value.

The other impediment to rapid animal improvement is the fact that most of the qualities we seek to incorporate into our herds are controlled by the actions and interactions of scores or hundreds of hereditary determiners or genes. To marshal these elusive creatures into the proper combinations is not easy. We use selection to try to do this job, but so often when we get some genes which we want, we get also some we

don't want. So we are continually breeding and weeding. In short, we are trying to increase the proportion of good genes in our stock at the expense of poor ones. If we keep suitable records of production, reproduction and probable environmental effects and use these records intelligently (and have a bit of luck) we can be more or less successful. The complicated workings of inheritance make it advisable—yes, necessary—that we pay some attention to close relatives as well as to high individuality. Some cow may make a big record because of fortunate circumstances and have close relatives that are only fair or mediocre. Her transmitting potential is suspect. But if a cow makes a big record and so did most of her paternal sisters and her dam and maternal sisters, then we can hope with some reason that she will transmit high production because she belongs to that kind of a family.

What To Do About It

What to do about selection, we have just stated—select from good individuals which have good close relatives and are members of good families. Selection in practical terms simply means choosing the parents for the next crop of calves. This is the principal tool which the breeder uses in trying to improve his stock. In terms of the hereditary units or genes, what the breeder is trying to do is to increase the proportion of desirable genes at the expense of the undesirable ones.

One good way to do this is to follow a system of line-breeding to some outstandingly good animals. There are many forms and intensities of line-breeding, as for example, mating half-brothers and sisters, granddaughters to grandsire, etc. The essence of line-breeding is to get some very desirable animal on both the top and bottom sides of the pedigree and fairly close-up (getting them very close-up results in closebreeding, e.g., parent and offspring or full brother-sister matings). The genetic theory back of line-breeding is that the very desirable animal being line-bred to must have a goodly number of dominant desirable genes. If we put this good animal on both the top and bottom sides of the pedigree, those offspring will probably get these dominant desirable genes from both its sire and its dam. This should make the offspring better than its parents and more pure in its inheritance so that it will transmit uniform excellence to all its offspring. There is always the possibility, however, that the offspring may get to be pure in its inheritance for some undesirable genes and in certain respects be worse than its parents. Line-breeding, in short, in-

tensifies what the common ancestor had, be it good or bad. Most of the better breeds today try to use line-breeding in an intelligent way to improve their stock, make the animals themselves more uniform and better able to transmit more uniformly. Since sons of good proved artifical bulls are being put into service, line-breeding is now possible in artificial breeding, although generally not to the extent that it is possible in a herd using natural service.

There still remains the question of an intelligent handling of environment in the choice of the bulls which we said to start with will make or break any breed or breeder. When we choose a young sire, we have only two things on which to try to form a judgment of his genetic worth. One of these is how the youngster looks. If you can tell very accurately how the daughters of a presently six months old bull calf will look and perform, three, four or five years hence, you are a better man than I am. I will still pick a straight, strong, dairy type young bull, but I won't risk a nickle on a bet as to what he will sire in the way of type and production.

The other thing we have on a young bull is his pedigree, and that can get us into more of a mess than his type—can, I say—not necessarily will. As usually written, pedigrees can be quite misleading. First of all, they are extended for three, four or five generations. Some good inheritance back five generations in a pedigree will, after it has been halved five times, have only about three per cent of it left at best. The moral is obvious—pay a lot of attention to parents and their offspring and forget the rest.

Then, too, most present-day pedigrees give us information about the best offspring of bulls and leave out the mediocre or poor ones and only the best records of cows. This merely serves to build our hopes far above any possibility of realization.

New Look in Selection

The trend is now away from daughter-dam comparisons and toward a comparison of a bull's daughters' records and the herd average. We used to pretty well ignore environment and think that if a bull's daughters produced 100 pounds of fat above his mates that this was all due to inheritance. We are rapidly becoming disillusioned on that score. If a sire has an index of 500 pounds of fat in a very well fed herd, what will the daughters of a son of his produce from cows in a 400-pound herd. The greatest determining factor is apparently not this young bull's inheritance (whatever that might be and we don't know

what it is anyway) but that 400-pound environmental level of the herd where he is to be used.

Studies of many proved bulls used in artificial breeding show that their daughters in 450-pound environmental level herds average about 450 pounds, or a litle less, in 400-pound herds about that amount, and in 350-pound environmental level herds, they average about 350 pounds, or a little more.

So the "new look" in breeding is aimed at a practical discounting of environmental effects by comparing how bull's daughters have done in comparison with the average of the herd in which they happened to be tested, and by comparing cows' records with their respective yearly herd average rather than accepting them at their seemingly apparent face value. How much more successful this new approach will be in pinpointing any bull's true genetic make-up, time alone will tell. All this involves more herd testing year after year—a movement that has been gaining in recent years and we think rightfully so.

If a sire has an index of 500 pounds of butterfat, what can we expect the daughters of a son of his to produce? The first question to be asked is what is the level of production of the herd where the young bull is to be used? Is it a 500-pound, 400-pound or 300-pound herd? The herd level where the young bull is to be used is the greatest determining factor in how much the young bull's daughters will produce. Whatever that herd level is, we can add some small fraction of (1) the amount by which the daughters of the sire exceeded their herd average, (2) the amount by which the dam's production (over several years preferably) exceeded the herd average where she was tested, and (3) the amount by which the daughters of the dam exceeded their herd average. The result will be what we can reasonably expect the daughters of this young bull, produced and tested in that herd, to do.

In short, the "new look" in breeding is aimed to get away from "absolutes" (indexes, records, etc.) and down to the "relative" practical situations in herds as they are found day by day and year by year.

Final Word In Breeding—Never

And all this is not the last word in breeding. Hopefully, there will never be any last word. But it is, we think, a step in the right direction.

The bulls used make or break any breed or any breeder. With a smaller proportion of them being registered and used every year, it behooves any breed to do everything possible to see that the right ones, the real

breed improvers, are the ones that do get used.

The great question is not whether to breed naturally or artificially. There is a place and a need for both. The great question is how to spot the real breed improvers and get them used early and long.

Purebred breeders of dairy cattle face a new and difficult challenge because of the advent of artificial breeding. Bull calf registrations and sales have declined because of artificial breeding. Now more than ever before, the breeder must set his house in order. He must learn the workings of inheritance even down to some of the minute details. He must keep more accurate records of production and reproduction year after year, and he must learn to use his records, critically and intelligently. He must learn the very intricacies of breeding systems. And he must sharpen his tools of selection. In short, he must become a really constructive breeder. When volume goes down, quality must go up. More than ever before, **the future of the dairy industry devolves upon the purebred breeder, since he will continue to be the creator of most of the bulls which find their eventual "outlet in artificial breeding units.** And financially, one truly good bull sold for $3,000 will yield more profit than 10 of any old sort selling for $300 each. Constructive breeders can and must meet the challenge of artificial breeding in a constructive manner.

Blackstrap Molasses For Feed

Blackstrap molasses can replace up to one-half of the concentrate in the ration of milking cows. The most practical method of feeding molasses is to pour it on top of the roughage. In tests recently conducted, one group of cows was fed 4 pounds of molasses per cow daily to replace one-fourth of the concentrate; another group was fed 8 pounds of molasses to replace one-half of the concentrate. The cows in the two molasses-fed groups produced as well as those in the control group to which no molasses was fed. The feed cost per 100 pounds of milk averaged $2.60 for the control group, $2.55 for the cows fed 4 pounds of molasses per cow, and $2.49 for the cows receiving 8 pounds of molasses per cow. The cows were fed 6.7 pounds alfalfa hay per cow daily and all the corn silage they would eat. The molasses was poured on top of the corn silage.

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Baled Silage

In England, only 16% of farmers make silage despite a great deal of official encouragement. Silage is too much hard work, they say. To remedy the situation, the pick-up baler is being recommended as a silage machine.

The new system starts with the mower. A second grass board is attached to the inside end of the cutter bar. It helps center and gather the swath ready for the baler.

Balers are modified to produce a tighter, half-size bale. The International B45 gets a double trip finger on the knotter to produce a bale 15" to 18" long. A spring with tension adjustment is added to hold down the feed auger for more even feeding. In short crops, a 2½ ft. long plate fills the base of the bale chamber to prevent buckling of the bale while being formed.

Experience shows 4 to 6 tons of silage can be baled per hour. Bales are picked up by hand and hauled in on low, flat trailers. Baie loaders won't work because the short bales tend to roll.

There is, apparently, no objection to lifting and loading the 50 to 65 lb. bales. The work goes fast. Several acres can be cleaned up in a short time. Towing a wagon and catching bales as they come from the baler, might be a better way.

For storing silage, pit silos are preferred. Bales are placed with twines running across the pit. Since bales vary little in width and depth, it is easy to place and pack them tightly against each other to insure the minimum of gaps and air spaces. Further consolidating is done by driving a tractor over the tightly packed bales.

After first day of filling, a thermometer is used to check bottom layer of silage. Temperature should be 100 to 120 degrees F. If crop is baled wet, more time is given for the heat to rise. Pits are sealed with 6 to 9 inches of straw covered with earth or sawdust. When silage is fed, bales are compressed to about 10 inches thick. Bale twines are not rotted in good silage and make it easy to lift out and haul the bales.

So far as we know, no extensive work with baled silage has been done in this country. For the farmer who hesitates to invest in a chopper, chopper wagons and blower; it would appear to offer advantages. As to labor required, the chopper together with unloading wagons is hard to beat.

Based on an article in Farmer and Stock-Breeder.